FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1930

April 19 .. **Leicester Flying Meeting.**
April 21 .. **N.F.S. Air Meeting, Hanworth.**
April 26 .. **N.F.S. Air Meeting, Leeds.**
April 26 .. **45 Sq. (R.A.F.) Reunion Dinner at "Crown and Cushion," London Wall, E.C.**
May 2 .. **A.I.D., T.S.A. Dinner at Hotel Russell.**
May 17 .. **Flying Display and Opening of Brooklands Aero Club.**
May 31 .. **Official Opening and Air Pageant, Bristol Airport.**
June 7 .. **N.F.S. Air Meeting, Reading.**
June 9 .. **Northampton Flying Meeting.**
June 14 .. **Manston Garden Party.**
June 15 .. **N.F.S. Air Meeting, Nottingham.**
June 19 .. **Household Brigade Flying Club Meeting at Heston.**
June 21 .. **Air Rallye at Haldon Aerodrome, Teignmouth.**
June 26 .. **Ipswich Air Pageant.**
June 27 .. **R.A.F. Dinner Club Annual Dinner.**
June 28 .. **Royal Air Force Display, Hendon.**
July 5 .. **King's Cup Race and Hanworth Air Pageant.**
July 13 .. **N.F.S. Flying Meeting, Leeds.**
July 19 .. **N.F.S. Flying Meeting, Hull.**
July 20-Aug. 7 **International Light 'Plane Tour of Europe, starting from Berlin.**
July 26 .. **Norwich Flying Meeting.**
July 31 .. **Entries close for 1931 Schneider Trophy Contest.**
Sept. 1-6 **5th International Air Congress at The Hague.**
Sept. 6-28 **Aero Exhibition, Stockholm, Sweden.**
Sept. 20 .. **Liverpool Air Pageant.**
Sept. 27 .. **N.F.S. Air Meeting, Hanworth.**
Nov. 28-Dec. 14 **Paris Aero Show.**
Dec. 31 .. **Closing date for the Aga Khan's Prize for Indian Flight.**

EDITORIAL COMMENT

CERTAINLY, it cannot be claimed that anything new, startling, or even very original, was said during the debate on air policy in the House of Lords on April 9. Every one of the noble Lords only expressed what has been said many times before. As on previous occasions, the views of the three services differed considerably, and showed no signs of better understanding of each other such as we hoped might materialise.

Air Policy in the House of Lords

In fact, the debate on British air policy produced just one more convincing proof of the need for a Ministry of Defence. But, for all that, the debate was useful from two aspects: It gave Lord Trenchard an opportunity to make his maiden speech in the House of Lords, and it brought forth supporting and opposing views from the heads of the three services. This was all to the good. Rarely does the civilian have the benefit of the opinions of heads of the services on matters of policy, and still more rarely is granted him a glimpse of the one-sidedness of the arguments which each service puts forward in support of its own prior claim to be regarded as the mainstay of Britain's armed forces.

Lord Trenchard's maiden speech was exactly what one would have expected it to be. As the man whose task it has been to reduce the R.A.F. from its war-time greatness to a small nucleus on a peace-time basis, laying a solid foundation upon which again to build up the service, he more than anyone knows the ability, as well as the shortcomings, of an air force. In asking the Government for a statement of its policy, Lord Trenchard carried on the suggestion of Sir Samuel Hoare in the House of Commons during the debate on the Air Estimates, and in so doing he very naturally sketched an outline of what has been the history of the Royal Air Force since the war. Some of the noble Lords who spoke afterwards appeared to ascribe to Lord Trenchard claims which he did not make and aspirations which we do not think he harbours, overlooking the fact that what he really did was to ask for an inquiry into the

problem of how far the R.A.F. could with advantage take over some of the work at present being done by the older services. Lord Gorell pointed this out, and in so doing brought the debate back to its original subject, which was beginning to be ignored. We think Lord Trenchard expressed himself with moderation, and he was on safe and proven ground when he stated that the R.A.F. felt that by the possibility of using it quickly in far-distant places it might prevent trouble, instead of having to wait months for a ground expedition to be prepared. He was asking for an inquiry which everyone who takes the slightest interest in matters of Empire policy must admit to be very seriously needed, and he concluded by saying that if the R.A.F. was not proved able to do some of the work of the older services at smaller cost in money and lives, then there was no justification for making any alteration in the present system. Surely, no fair-minded student of policy could wish for a more moderate suggestion than that.

Earl Beatty disclaimed any desire on the part of the Navy to police the Red Sea and Persian Gulf, at the same time refusing to believe that flying-boats could do the work now carried out by the sloops of the Navy. We rather fear that Earl Beatty underrates the abilities of the modern flying-boat. It should not be very difficult to devise a small light craft which could be carried on board the flying-boat and used for sending a search party on board the dhow, the flying-boat standing by the while and its machine guns providing a useful deterrent. And it would be interesting to know how many dhows manage to get past the Navy sloops because of the limited speed and range of vision of the surface vessel. A flying-boat could patrol in a few hours an area which the Navy possibly cannot "sweep" more than once every few weeks.

The Earl of Cavan complained that Lord Trenchard should have raised the subject of air policy when he was Chief of the Air Staff, by submitting it to the Committee of Imperial Defence, and he raised the subject of bombing by aircraft, expressing astonishment that this great question had never yet appeared on the agenda of the Powers at Geneva.

The Marquis of Londonderry spoke with that sympathy for and understanding of the Air Force which one might expect from a late air minister, and asked for enlightenment concerning the likelihood of certain foreign Powers completing their present policy of expansion.

Viscount Plumer's picture of the pacifying influence of daily contact between the officers and men of the Army and the inhabitants of the countries over which the Army keeps guard was pretty but somewhat unconvincing. One cannot help thinking that Lord Plumer had in mind the relationship between the Germans and the army of occupation when he drew this picture. And no one, Lord Trenchard least of all, would advocate the use of the R.A.F. for occupation of a country as highly developed as Germany. Lord Lloyd shared his views on the benefits of direct contact between British officers and the heads of tribes, and spoke of the way in which now the presence of British troops was welcomed on all sides.

Lord Thomson emphasised that there is no adequate defence against surprise attack by aircraft, and that, unpleasant as the truth may be, in air matters the only defence is fear of reprisals.

Lord Thomson's expressed surprise that Lord Cavan should still believe that one could humanize war, will, we think, be shared by the great majority. For a bomb is only the shell of a long range gun.

On the subject of the relative size of the Air Force of Britain and the air forces of foreign Powers, Lord Thomson will have the support of the whole country in his claim that the aim of the present Government, and of past Governments as well, has been to avoid as long as possible a race in air armaments. As Lord Thomson said, Great Britain has a clear conscience in this respect. One sentence from Lord Thomson's speech deserves all the prominence it can be given: "You can limit air forces, but you cannot limit air power." The distinction between the two is not always made with sufficient clearness. Great Britain we fear, has so far limited both, without other nations showing an equal willingness. That state cannot go on indefinitely.

THE FIRST PRIVATELY-OWNED "CUTTY SARK": Mr. Norman Holden has the distinction of being the first private individual to purchase one of the Saunders-Roe "Cutty Sark" Amphibians with "Hermes" engines. Last week he visited Hanworth in his machine, which carries the indentification letters G-AAIP.
(FLIGHT *Photo.*)

"GLOSTER"

METAL CONSTRUCTION

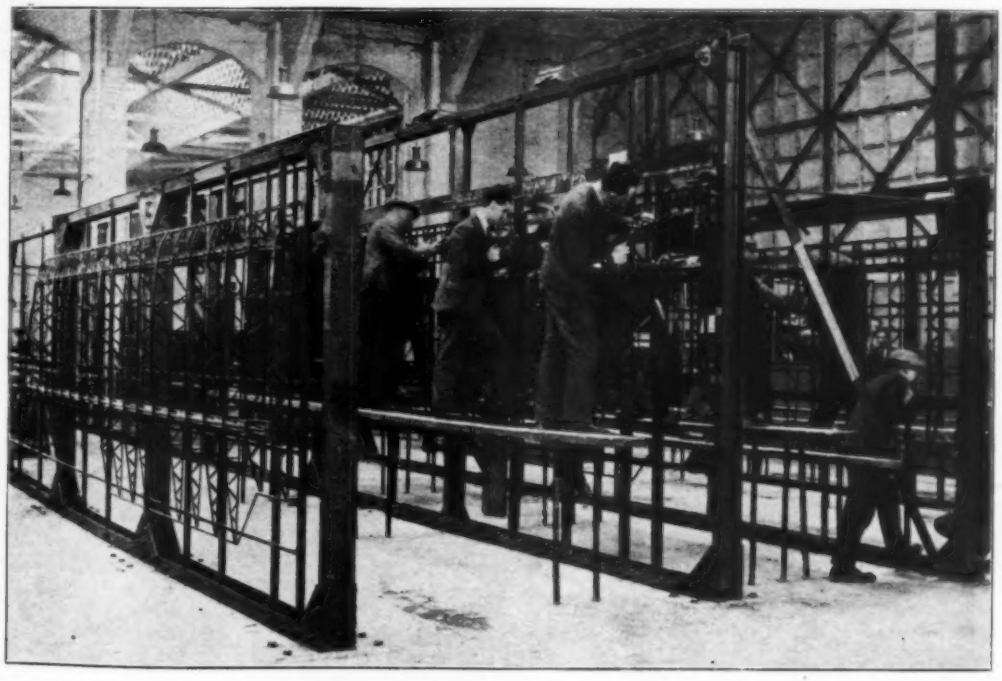
PROBABLY most of our readers will recollect that some years ago the British Air Ministry intimated to the aircraft industry that, owing chiefly to difficulty of ensuring, in time of war, adequate supplies of woods of the high quality demanded, in the future it would be necessary to insist upon all-metal construction of aircraft built for the Royal Air Force. A time limit of two years was granted the firms of the aircraft industry in which to evolve forms of all-metal construction. The Air Ministry very wisely decided that the best policy would be to let each firm make its own choice in the matter of metal constructional systems, and not to tie the firms down to one or two types of construction which had by then been evolved and found reasonably satisfactory. The result has been that the twenty-odd aircraft firms which produce service aircraft have evolved between them almost as many forms of construction. That all are not equally good may be taken for granted, but at any rate the fact that machines built according to all the different systems are accepted by the Air Ministry indicates that there is little to find fault with in any of them. Not that finality has yet been reached. Very far from it. On the contrary, development still goes on, and already it can, we think, be claimed with perfect justice that British forms of metal construction lead the world. British types of metal construction may not be the cheapest in the world. They may, in some cases, appear to the foreigner a little extravagant in their attention to minute detail. But their outstanding quality is not questioned. And the Air Ministry's policy of giving each firm a free hand to evolve the best has resulted in Great Britain having not one or two but a very large number of different systems of construction, any of which gives excellent strength/weight ratios, long life and reliability under service conditions.

By now all the British aircraft firms which build machines for the Royal Air Force have gone over to all-metal construction, and illustrated descriptions of the systems evolved or adopted by a number of firms have already appeared in FLIGHT. It is our hope to describe in this way the metal construction of all the British firms, but to do so requires both time and space. Thus the article on "Gloster" metal construction which follows has been in preparation for some considerable time, but lack of space has prevented its publication until now. We hope to publish others shortly.

We have not the space here to refer in detail to the history of the evolution of the forms of metal construction used by the Gloster Aircraft Co., Ltd. Suffice it to recall that in 1927 the Gloster Company bought up, from Mr. D. J. Mooney, the Steel Wing Company which Mr. Mooney had founded during the war, and which had done a great deal of pioneer work in the development of metal construction. One of Mr. Mooney's chief assistants during the pioneer years was Mr. D. Emby, and when the Steel Wing Company was absorbed in the Gloster Aircraft Company, Mr. Emby remained, and still remains, in charge. It goes without saying that since taking over the older company the Gloster firm has not been content to stand still. The forms of construction evolved and patented by the Steel Wing Company have received the addition of new forms of construction covered by new patents, and the process of evolution has gone on and is going on at the Brockworth works of the Gloster Company.

From the first, Mr. Mooney and his colleagues showed a preference for steel as their structural material, and this preference is maintained by the Gloster Company, steel being the material used for all highly-stressed parts, although the firm is not prejudiced to the extent of excluding light metals where these are considered to offer a better solution.

Crinkled strip was the beginning of efficient metal construction, and crinkled strip still remains the characteristically British way of giving stiffness to thin-walled sections under compressive loads. Modern technique has enabled the aircraft constructor to produce his various sections from the flat strip supplied by the steel manufacturer either in the heat treated or untreated state. The practice at Glosters is to obtain the steel strip from the manufacturer already treated. This reduces the operations that have to be carried out by the aircraft constructors and avoids the necessity



IN THE WING ASSEMBLY SHOP: Vertical jigs are used, which permit the workers to get at both sides of a wing simultaneously.

for installing either gas furnaces or an electric plant for heating the strip. On the other hand, the actual handling of the strip, either by rolls or dies (both are used at Brockworth) is probably somewhat more difficult or at any rate requires considerable experience, but as Mr. Emby has now been engaged upon this particular class of work for something like fifteen years, he is not likely to be deterred by this fact. As we have said, the Gloster plant at Brockworth includes both rolling plant and draw benches, the use of one or the other method being governed by the character of the particular member to be manufactured.

Some typical structural members are illustrated in the accompanying sketches, a "key" diagram in the top left-hand corner of the block on this page, showing location of parts in the wing structure. A typical main wing spar section is illustrated in Fig. 1. It will be seen that the spar is composed of four corrugated strips, secured together by riveting along the curled edges. The rivets are easy to get at, and the riveted joint is some distance away from the region of maximum stress.

The designer of metal aircraft is faced not only with the problem of producing main spars which are simple to manufacture in themselves, but also with so designing them that other members may be attached to them in a simple manner

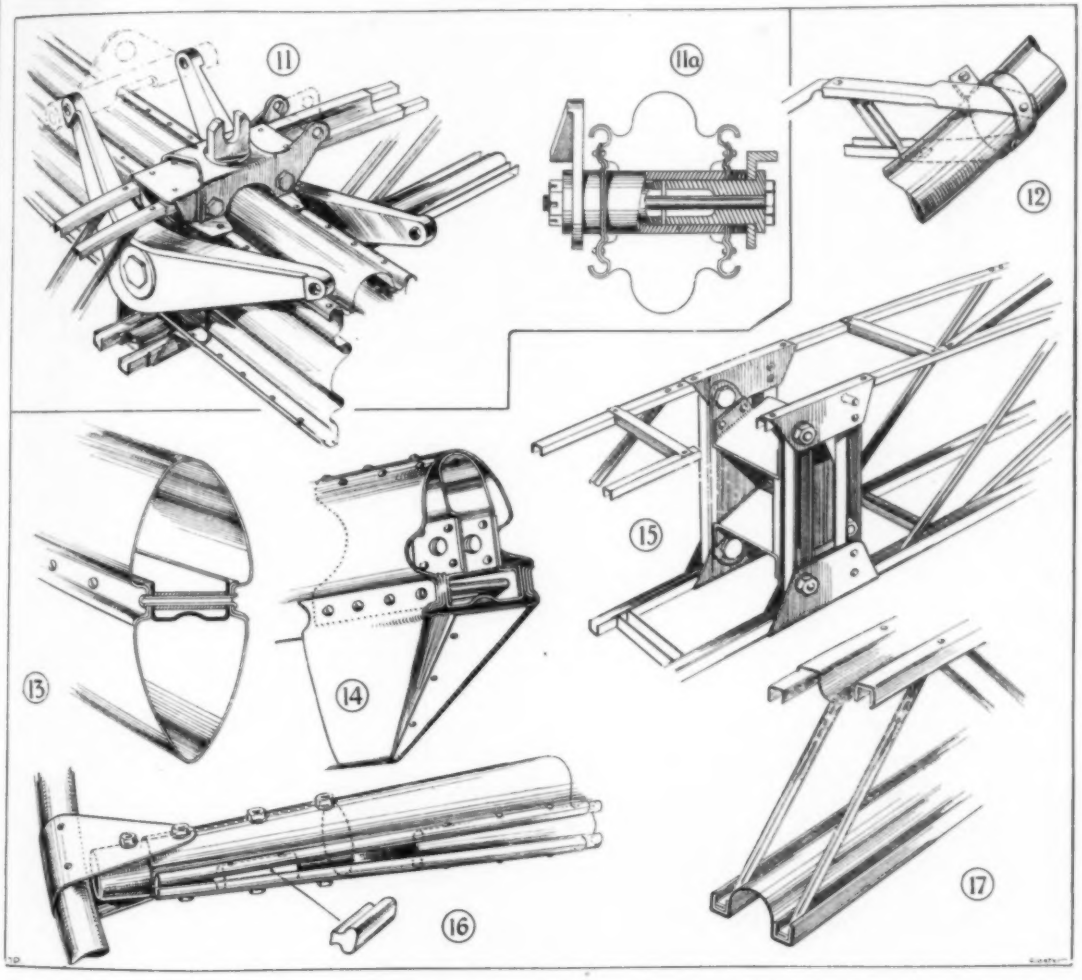
without complicated fittings. A light type of rib, used in conjunction with the box spars is illustrated in Figs. 4 and 5, and the manner of attaching such ribs to the spars by saddle plates is shown in 2. The rib flange is of channel section, while the continuous girder is of V-section, with the edges turned over. The sketches show how the rib bracing is attached to the flanges by riveting. Sometimes the stresses are such that certain lengths of the continuous girder web are in compression. Where that occurs, the web is locally stiffened by means of a sliding inter-locking piece (Fig. 6). It will be noticed that the rib flange passes around the tubular leading edge without being broken. This is done by flattening out the channel section of the flange and introducing a small strap which secures the rib flange to the leading edge, as shown in Figs. 8, 8A and 9. The method of securing the tubular trailing edge to the ribs is shown in Fig. 10.

Where a wing spar is subjected to heavy end loads, a diaphragm is introduced, as illustrated in Fig. 3. The diaphragm is held in position by clips, the securing rivets being added when the spar is riveted up. Various ways of reinforcing a main spar section are illustrated in Figs. 7, 7A, and 7B. The tubular distance piece takes the compression resulting from tightening up the bolt.

The attachment of the interplane struts and lift and anti-lift wires to the main spars is always something of a problem. The manner in which the Gloster company solves the problem is shown in Fig. 11A. A built-up tubular distance piece runs through the spar webs on the neutral axis of the spar section, the two halves of the distance piece being forced together by a bolt (see Fig. 11A). This bolt only holds together the male and female portions of the distance piece, and does not take the lift loads direct. On each face of the spar is a bent arm, machined to an L-section, the ends of which receive the bolt to which the lift and anti-lift wire is attached via a stirrup plate.

Where ribs are attached to a bent portion of the leading edge, such as at the rounded corners near the wing tip, a slightly modified form of leading edge clip is used, as shown in Fig. 12.

Built-up interplane struts are employed by the Gloster company, one form being illustrated in Fig. 13. This consists of a front portion of steel, with a fairing of aluminium. The method of building up the strut will be clear from the sketch. The ends of interplane struts are reinforced, as shown in Fig. 14, a large-diameter bolt passing laterally through the reinforcing plates, to rest in the notch in the vertical spar bolt (Fig. 11).

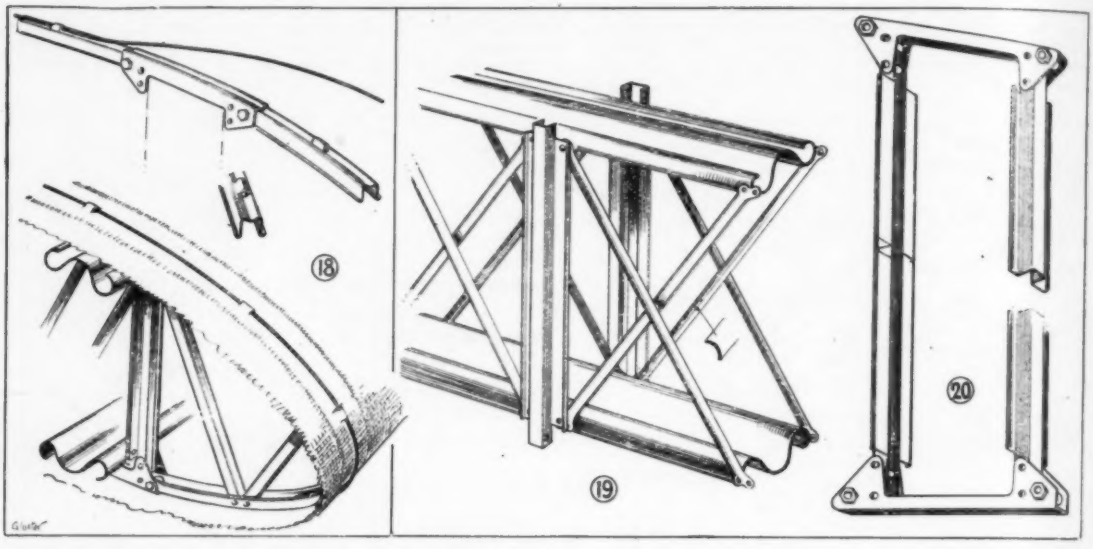


The normal type of rib has already been described. Stronger ribs are used where local loads of considerable magnitude have to be carried. For example, a built-up box girder type of rib, designed to carry an aileron control pulley inside the wing, is illustrated in Fig. 15, while a simple box rib composed of two normal ribs joined by cover plates at top and bottom is illustrated in Fig. 17.

The normal main spar section is not continued right out to the wing tip, as to do so would mean deep and ugly wing tips. The spar is tapered off, as shown in Fig. 16, and the wing tip tube attached to it by a clip.

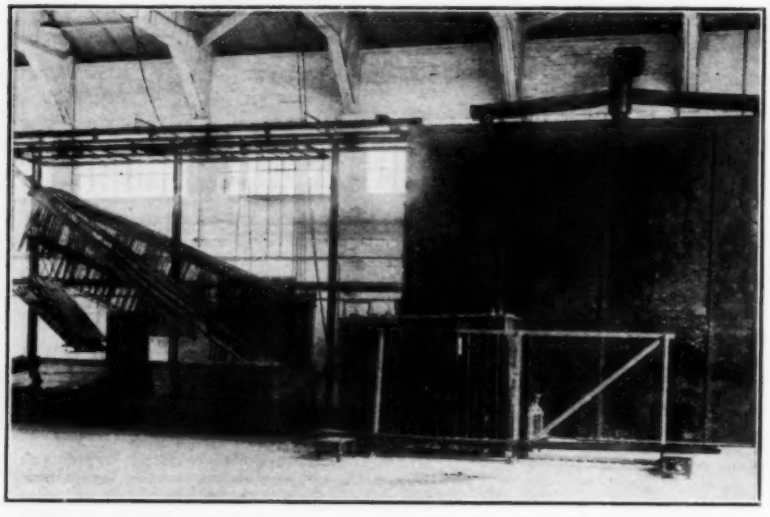
The type of main wing spar illustrated in Fig. 1 is employed in machines where the distance between supports is not great, such as in two-bay biplanes. Where a greater spar depth is available, owing to a deeper wing section, and where the distance between supports is considerable, the Gloster company makes use of a lattice girder type of spar such as that illustrated in Fig. 19. This type of spar has been found very economical in weight and relatively simple to manu-

facture, the number of rivets being small. Spars of this type are used, for example, in the Gloster survey machine. It will be noticed that there are no diaphragms in the ordinary sense of the term. Instead of these, short struts of trough section are riveted to the outside of the spar. These struts also serve as supports for the wing ribs, which with this form of construction are built in three sections. The rib flanges do not run across the spar flanges, but short saddles are attached to the spars, the rib flanges being attached to these. The arrangement will be understood from a reference to Fig. 20.



The type of rib which goes with the lattice spar is illustrated in Fig. 18. This type of rib has flanges of channel section, but the channel has a slightly hollowed back, which at intervals is pressed outward in the opposite direction, as in the inset of Fig. 18. The wing fabric is attached to the ribs by threading a long wire through these little "eyelets" a method of attachment which is both neat and strong, and avoids the usual method of vertical stringing. The building of the ribs in three pieces enables repairs to a damaged portion to be made quite readily in the field, as the damaged part can be removed and a fresh part substituted and attached by bolts and not by rivets.

In fuselage construction also the Gloster company has evolved its own methods. Although the type of construction varies somewhat in different machines, bolted joints are always made use of, and not welded joints. As one example, one may take the forward portion of the survey machine, in which square section tubes are used, the joints being by bolts and large fishplates, as in Figs. 21, 22 and 23. A very neat way of introducing internal distance pieces to avoid crushing of the steel tubes when the bolts are tightened up is shown in Fig. 24. The distance piece simply consists of a piece of flat metal strip, bent roughly to the form of a letter S. In the rear part of the fuselage circular section steel tube is used both for longerons and struts, and the method of joining them together is as illustrated in Fig. 25. A sheet steel pressing is wrapped outside the longeron through approximately 90 deg., and is formed with a lug for wiring and with a half-socket for the fuselage struts. Another pressing is placed on the inside of the joint, its flanges meeting those of the outside portion. An eyebolt passes diagonally through the longeron, securing the joint in place on the longeron as well as forming the anchorage for the transverse panel bracing wire. The resulting joint is very simple and neat, and once the necessary dies have been made and a few sizes standardised, the joint must be a very cheap one in quantity production.



THE ENAMELLING PLANT: A batch of ailerons suspended above the bath to drain off superfluous enamel prior to stoving.

Having described and illustrated some of the main components of the Gloster company's forms of metal construction a few words concerning the workshop methods of the firm may not be without interest.

Reference has already been made to the fact that the works at Brockworth are equipped with both rolling mills and draw benches. The latter are used, in addition to the production of small sections, largely for experimental work, the dies for a new section being a good deal cheaper than the corresponding rollers. The rolling mills are of a somewhat unusual type in that the roller spindles project from the sides of the main bed. This arrangement makes the rollers very accessible. The photograph on page 435 makes the system fairly clear.

When the spar sections, ribs, etc., leave the rolling mill or the draw-benches, as the case may be, they are assembled into complete wings. This assembly is done in vertical jigs of the type shown in the photograph on page 431. This form of jig is covered by one of the large number of patents which

the Gloster Aircraft Company now holds. The photograph gives a very good idea of the way in which wings of various sizes can be accommodated in the jig, and how the largest possible number of workers are enabled to concentrate, when desired, on one wing. Both sides of the wing can be got at simultaneously, and the workmen have the advantage of being able to work in an upright position. The jigs are so designed that all the main points of attachment, etc., can be accurately located, so that complete interchangeability is ensured. In the case of wings of very large chord the vertical jig might show less advantage, as the workers would then have to use some form of platform or scaffolding to reach the upper part, but for the type of wings for which they were designed, *i.e.*, wings of normal proportions, the Gloster wing jigs impress one as being singularly effective.

When the wing assembly is complete, the wing is heated to a moderate temperature for two hours or so in order to remove any oil or grease that may cling to the surface of the steel. The complete wing is then dipped in an enamel bath, hoisted out and allowed to hang for a short time above the bath so as to let superfluous enamel drip off, and is then run into a large gas-heated oven and baked. The fuselages are not dipped as a whole, but each component is stoved in a similar manner in a smaller plant.

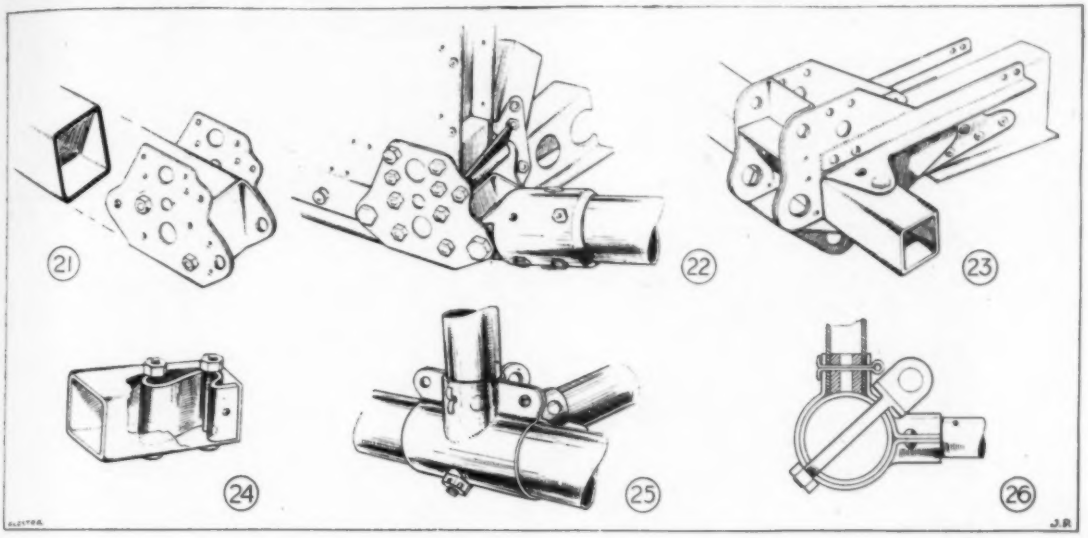
In the case of metal plate fittings, hardened master templates are made for each fitting on a machine. Care is taken that any bends in a fitting are of such radii as not to strain the metal, and hammering is avoided wherever possible by the use of special bending jigs and tools. All fittings are heat treated to remove any internal stresses set up by working the metal, and all heat treatment is accurately controlled by the liberal use of pyrometers. In the case of high-tensile steels, test specimens are heat treated with each batch of fittings, and tested for strength before the fittings are released for use on a machine.

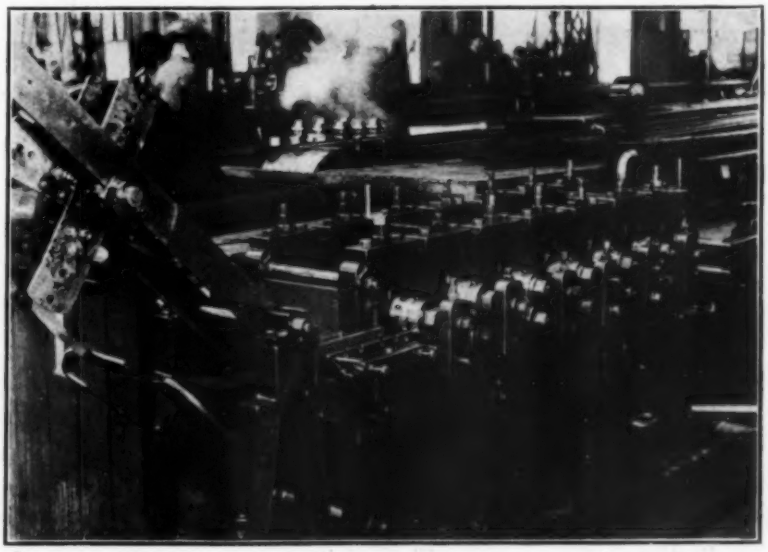
After heat treatment all fittings are shot blasted. This treatment removes all scale and oxide, and leaves the surface quite clean, so that the subsequent inspection has the best possible chance to discover any flaws or cracks that may have been produced in the metal during working.

After passing this inspection, all fittings are baked in an oven to remove all traces of oil or grease, and to dry off any moisture that might linger between riveted surfaces. After leaving this oven the fittings are dipped in enamel and stoved at a temperature of 250° to 300° F.

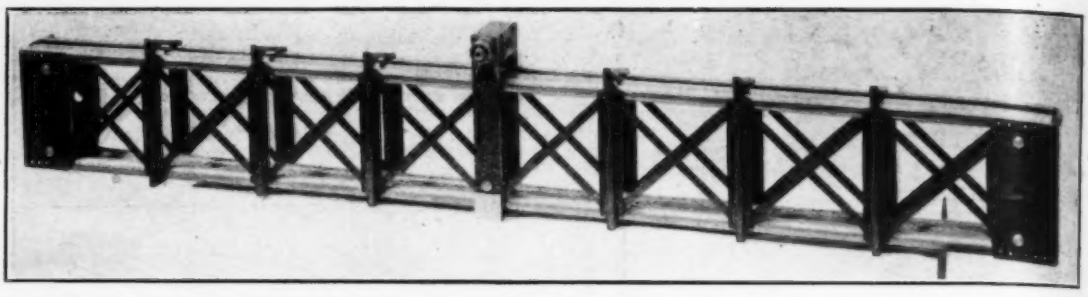
So far we have dealt with Gloster steel construction only. Light metals are, as mentioned previously, employed for certain parts, and in their manufacture as great care is taken as in the case of steel components and fittings. In addition to certain parts of the secondary structure of machines, Duralumin and aluminium are used for seaplane floats, tanks, fairings, etc., while the Gloster company produces a special form of metal airscrew, manufactured from Duralumin. This type of airscrew is machined from a substantial forging, twisting of the blades not being employed.

Protection against corrosion is sought by the process known as the anodic treatment, in which the article to be treated is placed in special baths, through which an electric current is passed. An oxide covering is thus formed, which being very hard and resistant to heat,



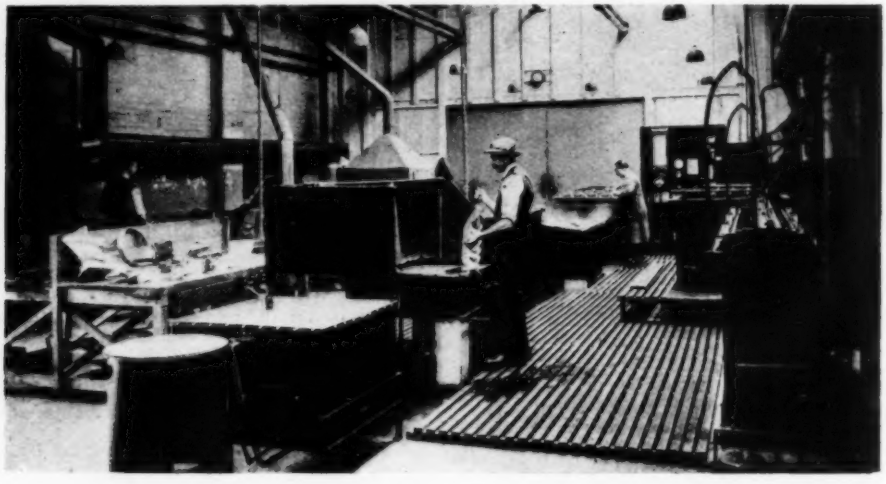


ONE OF THE ROLLING MILLS: The rollers are carried on spindles projecting from the sides of the bed, an arrangement which makes for accessibility.



A GLOSTER LATTICE SPAR: This photograph shows a section of a spar used for loading test purposes. Details of this spar construction are given in the sketches Figs. 19 and 20 on page 434.

weather and salt water, protects the material underneath from contact with the air. For heat treatment where great accuracy of temperature is necessary, such as in normalising Duralumin, duplicate thermo-couples are placed in the salt baths to warn the operator of any errors that may occur in the instruments themselves.



PROTECTION AGAINST CORROSION: A view in the Anodic Treatment Section.

THE NON-RIGID AIRSHIP A.D.1. G-FAAX

DURING the winter the above airship has received her Certificate of Airworthiness, following successful Air Ministry official trials.

The winter months have been devoted to improvements in the car, and these in the main consist of the following:—

1. A third cockpit to utilise some of the extra lift found available during official trials in excess of the figure estimated.
2. Hand-starting gear and priming pump to facilitate re-starting the engine in the air when necessary.
3. Coil ignition in addition to the magneto.
4. Dual elevator and rudder controls primarily for training, where these controls are at all times under the supervision of the pilot instructor.

A slightly larger diameter airscrew has been fitted to give increased forward speed, but the absence of an aero engine for airships is a handicap, existing engines being too high in r.p.m.

It is hoped, however, to embody an attachment to the "Hornet" engine to reduce the r.p.m. of the airscrew to approximately 1,000, which it is considered would give an added forward speed to the A.D.1 of from 3 to 5 m.p.h.

As regards similar size airships, it is found that a car to accommodate four persons and a certain amount of light freight could be fitted to the A.D.1 type of envelope for normal commercial use and such an aircraft would have an endurance of 15 hours' flying with normal tankage. Three alternative cars have been designed to meet the requirements of various markets, and these are the open type, the semi-enclosed and the enclosed cabin.

Readers will be interested to learn that the Airship Development Co. propose in conjunction with other parties, to open a training school for pilots.

It is their belief that Aerial Navigation instruction can be more efficiently carried out on these small airships than with the high-speed aeroplane, as by turning the airship "head to wind," the speed can be reduced almost to zero and accurate observations taken.

International Touring Competition

INTENDING competitors are reminded that the entries close on April 15, 1930. Entries from British competitors should be sent to the Royal Aero Club. The entry fee is 1,000 francs (£8). Late entries, at double fees, will be received up to May 15, 1930.

R.A.F. Station at Pembroke

ON April 1 Pembroke dockyard was taken over from the Admiralty by the Air Ministry. An oil-fuel depot will remain there as a last connecting link with the Navy. The R.A.F. station will naturally be under the control of the Coastal Area, and may be used as a base for flying boats.

PRIVATE FLYING AND CLUB NEWS

An Aerial View of the Hull Municipal Aerodrome at Hedon. (FLIGHT *Photo.*)

HULL AIR PAGEANT

YET another of the N.F.S. Orange-and-Black "Standards" is now in full bloom, for last Saturday saw the official opening of the Hull Aero Club Clubhouse at Hull Municipal Aerodrome, Hedon. The event, which was performed by Sir Sefton Brancker, Director of Civil Aviation (who, by the way, should feel quite at home in these Clubhouses soon), was also the occasion of a very successful little Air Pageant.

Hedon Aerodrome, it will be remembered, was opened by Prince George on October 10 last, and the Clubhouse now puts the finishing touch to a very excellent aerodrome. As we said before, Saturday's affair was quite a success and enjoyable—the weather was fine, the programme good and the attendance about eight thousand strong.

Proceedings commenced, shortly after 2 o'clock, with the opening of the Clubhouse by Sir Sefton Brancker, who had flown up to Hull from London the previous day. Sir Sefton, in his "opening" speech—which, thanks to the efficient Marconi Broadcasting arrangements, could be heard quite distinctly from the far side of the aerodrome—said he wished to congratulate Hull on the enterprise of its local authorities. It had established a record in the rapidity in securing a site for an airport and in opening the aerodrome. Hull, he said, was the third municipal aerodrome in this country to be licensed. He wished the Club and National Flying Services every success.

At 2.30 p.m. came the first event on the programme—the Kingston-upon-Hull Air Race for the Sir Arthur Atkinson Challenge Trophy (1st Prize), the *Hull Evening News* Cup (2nd Prize) and the Hull Brewery Co.'s Cup (3rd Prize). It was a handicap race over four laps of a 7½-mile circuit, crossing the aerodrome, and was quite a good race, as the machines were in view all the time.

Originally there were ten entries, but for various reasons three of these did not

Sir Sefton Brancker declares the Clubhouse open. Beside Sir Sefton are the Lord Mayor of Hull and the Lady Mayoress, and on the right Col. I. Edwards and Mr. G. Boyes of N.F.S. (FLIGHT *Photo.*)

Miss Amy Johnson, a native of Hull, chats with Sir Arthur Atkinson (Chairman of the Hull Aero Club), the Lady Mayoress and the Lord Mayor of Hull (Councillor R. Richardson, J.P.). (FLIGHT *Photo.*)

Above, the N.F.S. Heavenly Triplets, Schofield, Wilson and MacKenzie, are seen formating in "Moths." Below, the "Breda," from Italy, makes a first appearance at a British flying meeting, piloted by Mr. Store. (FLIGHT *Photo.*)

race. The seven starters, together with their handicaps, were as follows :—

	m.	s.
(1) Miss W. Brown. Avro "Avian"—EBVZ ("Cirrus II")	3	58
(2) F./O. Leech. Slotted D.H. "Moth"—AASG ("Gipsy")	2	9
(3) Miss W. Spooner. D.H. "Gipsy Moth"—AALK ..	1	59
(4) Ivor Thompson. D.H. "Coupe Moth"—AACL ..	1	36
(5) A. Jackaman. D.H. "Gipsy Moth"—AADX ..	1	36
(6) R. G. Cazalet. Westland "Widgeon"—EBRM ("Hermes")	0	40
(7) Capt. Thorne. Avro "Avian"—AAHJ ("Cirrus Hermes)	Scratch	

F./O. Leech was flying Miss Perry's (Berks, Bucks & Ox.) "Moth," while Capt. Thorne flew J. V. Holman's "Avian."

The get-away was quite spectacular, for as soon as the machines had taken off they had to turn sharply to the left at the opposite side of the aerodrome to enter the course. All retained their original positions at the end of the first lap, but on the second lap F./O. Leech overhauled Miss Brown, and Capt. Thorne got ahead of Cazalet. On the third lap Leech retained the lead, and Miss Brown dropped to fifth place. Thorne overhauled Jackaman, and got into fourth place.

In the final Leech crossed the line first, with Thorne seven seconds behind him; Miss Spooner came in third 19 seconds later, and Ivor Thompson and Jackaman were fourth and fifth respectively. Cazalet picked up a bit on this lap, and tied for sixth place with Miss Brown—the latter, if anything, being a mere fraction ahead.

Although first home, Leech—whose speed for the course was 98 m.p.h.—was disqualified for not turning at one of the marks, so first place went to Capt. Thorne, who made 111 m.p.h. Miss Spooner, who was second, did 97½ m.p.h. Thus the Challenge Trophy—which was presented later by Sir Arthur Atkinson personally—went to Capt. Thorne.

Immediately after the race the N.F.S. D.H. "Giant Moth" *Leone*, piloted by Flight-Lieut. Styran, and a Desoutter cabin monoplane, commenced a very busy afternoon's work in joy-riding, whilst Capt. Thorne, to show that there was "absolutely no deception," went up again in the "Avian," and went through a fine display of stunts.

Then came the "Fly Past," in which the various types of machines present took off and flew past the Clubhouse—there were "Moths" with "Jupiters" (Giant variety), with "Cirruses," with "Gipsys," with slots and without; there were "Avians" ("Cirrus" and "Hermes"), a "Spartan," "Widgeon," "Desoutter," Blackburn "Bluebird" and a "Breda"—the latter making its first public appearance at a flying meeting in this country.

Capt. Ayres (Chief Instructor at Hull) and Mr. Rossitter worked hard to make the programme run smoothly—and succeeded. (FLIGHT *Photo.*)

The line up for the Kingston-upon-Hull Air Race. (FLIGHT *Photo*)

Seen at Hull: (Left) Mr. A. T. Andrews and Col. L. A. Strange of Simmonds Aircraft, Ltd. Mr. Andrews is Test Pilot for the "House of Spartans"

"Cirrus Hermes" at Hull: (Right) Capt. Thorne (left) who won the handicap race on a "Hermes Avian," Mr. E. Olney ("Cirrus" Works Manager), and Mr. R. G. Cazalet, who flew a "Hermes-Widgeon." (FLIGHT *Photos.*)

After this, Flt.-Lt. H. M. Schofield gave a splendid display of aerobatics on "Moth" AAPA, including upside down flights and low loops. A demonstration of the "Autogiro" was to have followed this, but, unfortunately, this interesting machine was unable to be present.

For the next event, the N.F.S. Heavenly Triplets, Flt.-Lts. Schofield, Wilson and MacKenzie, went up in their "Moths" and put up some very nice formation flying, including simultaneous loops and concluding with a really excellent format landing.

An event of local interest happened about this time, when Miss Amy Johnson, a native of Hull, who learned to fly at the London Aeroplane Club, and who is the first woman to gain the A.M. Ground Engineer's "A" licence, went up in a "Moth." By this time the various N.F.S. joy-riding machines got busy taking up passengers, who were lining up in large numbers.

Meanwhile, John Tranum gave an exciting "jump" with an extra large Russell Lobe parachute from a "Bluebird." He jumped from about 1,000 ft., and to avoid landing outside the aerodrome he had to side-slip the 'chute (by pulling in one side) and so landed nicely inside.

Capt. Blake next gave a magnificent display on the Blackburn "Lincock," the outstanding feature of which consisted of a most remarkable upward spin really wonderful to behold.

The proceedings came to an end with a terrific bang, for Capt. E. D. Ayre, who so far had spent most of the afternoon talking—through the microphone!—went up in a "Moth" and bombed the level crossing on the rail-less railway line in the centre of the 'drome. After several swoops and dives, he let go, and up went the level crossing with a bang which would certainly have wakened any "sleepers" had there been any! Fortunately, Capt. Ayre did not attack the *real* level crossing on the L.N.E.R. adjoining the aerodrome!!

"TONY": Miss Cribb, the Secretary of the Berks, Bucks and Oxon Aero Club. (FLIGHT *Photo.*)

THE NOTTINGHAM GLIDING CLUB is going ahead fast since its formation. A site has been obtained at Oxton due to the kindly interest of Capt. Sherbrook and the local farmers. An order is being placed for a glider so that members may start getting experience before serious work is carried out on more advanced types of soaring 'planes.

HANWORTH CLUB.—An Air Pageant will be held on Easter Monday, at 2.30 p.m. The programme of events will include displays by well-known pilots, air races and demonstrations of the latest types of civil aircraft. Club flying will be suspended entirely on this day.

An enclosure for members and their guests will be provided adjoining the club grounds. Luncheon and tea will be available.

It will be of great assistance if early application is made for tickets and motor car labels: to the Secretary, National Flying Services, Ltd., Grand Buildings, Trafalgar Square, W.C.2.

Visitors arriving by air do not require tickets of admission, but they are requested kindly to send advance notice of their intention to be present, and to land before 12.30 p.m.

Flying regulations will be issued at the aerodrome by the pilot-in-charge of flying. Admission: Club Enclosure.—Members and their cars will be admitted free on presentation of membership cards. Guests' tickets, 5*s.*; guests' car tickets 2*s.* 6*d.* Public Enclosures.—1*s.*, 2*s.* 6*d.* and 5*s.* Cars, 2*s.* 6*d.*

BRISTOL INTERNATIONAL AIR PAGEANT, May 31, 1930.—At the International Air Pageant on the occasion of the official opening of the Bristol Air Port by His Royal Highness Prince George on May 31, it is intended to hold two races. The race for the Society of British Aircraft Constructors' Challenge Cup and the Bristol Aerial Derby.

The challenge cup, which carries with it a cash prize of £75, is awarded to the light aeroplane club which enters the winning aircraft, and the race is over a course of approximately 30 miles.

The second race, the Bristol Aerial Derby, is an open handicap race for the following prizes:—1st, cup presented by Messrs. Merlyn's Motors, Ltd., and £100; 2nd, £50; 3rd, £25.

The heats of this race will be two laps of approximately 30 miles each lap, and both races will be under the competition rules of the Royal Aero Club and the Federation Aeronautique Internationale.

Entry forms and further details can be obtained from the Bristol and Wessex Aeroplane Club, Bristol Air Port.

THE FLYING TEST: Last week we showed this Moth, and through a printer's error it was called the property of W. B. Rich. It does, of course, belong to W. B. Dick, the makers of the well-known "Ilo" brand lubricating oils, and their Moth is being used as a "test shop" for the mineral oil which is advised as being the most suitable for all such machines. (FLIGHT *Photo.*)

LONDON AEROPLANE CLUB.—The Club will be open on Good Friday, Saturday and Sunday, and will be closed on Easter Monday and Tuesday.

THE KENT GLIDING CLUB has now secured a site for their activities which is by the White Cross on the hillside (North Downs) at Lenham, on the main London to Folkestone Road.

The Club held a general meeting on Thursday evening, April 3, when a good many members joined up. The Club is open to accept non-flying members and flying members, the subscription for same being 10s. and £1 per annum respectively. Entrance fee, 10*s*.

Anybody interested should get in touch with the Hon. Sec., Mr. E. Parks, the "Nag's Head Inn," 76, Week Street, Maidstone, Kent.

MR. PHILIP H. MEANLEY wishes to start a gliding club in Birmingham, and to get in touch with other local enthusiasts. Will those interested apply to him at 105, Hunters Road, Handsworth, Birmingham.

THE LONDON AEROPLANE CLUB took delivery of a new D.H. Gipsy all-metal Moth on Friday, April 11, bringing the number of Club aircraft up to seven.

The Club can now accept a few more flying members.

During the week-end April 12, 13, there was considerable activity in the air, and on Sunday 32 members made solo flights and 17 received flying instruction. Miss E. J. Muntz and Mr. J. W. H. Harrison qualified for their "A" licences.

Maj. Travers, the chief instructor, is taking particular interest in formation flying, and already considerable progress has been made in this direction.

THE AUTOGIRO: The Autogiro is now to be seen at nearly all the flying meetings, and never fails to create great interest. (FLIGHT *Photo.*)

Reception to Mr. Chawla and Mr. Engineer

THE British Empire League held a reception in honour of Mr. R. N. Chawla, the first Indian pilot to fly from India to England, with the owner of the machine, Mr. A. Engineer, at the British Empire Club on April 10, at 5.30 p.m. The guests were received by Lieut.-Col. the Right Hon. Sir Leslie O. Wilson, G.C.S.I., G.C.I.E., C.M.G., D.S.O.

Among those attending were :—

D'Arcy W. Addison (Agent-General for Tasmania), Sir Charles and Lady Barrie, Sir Henry Barwell (Agent-General for South Australia), Air Vice-Marshal Sir Sefton Brancker (Director of Civil Aviation), the Hon. R. Randolph Bruce (Lieut.-Governor of the Province of British Columbia), Sir Atul Chatterjee (High Commissioner for India) and Lady Chatterjee, Flight-Lieut. and Mrs. A. L. Chick, the Hon. Sir James Connolly (Agent-General for Malta) and Lady Connolly, Lieut.-Col. Ivo Edwards (National Flying Services, Ltd.), Air-Commodore P. F. M. Fellowes (Directorate of Personal Services, Air Ministry) and Mrs. Fellowes, Herbert Greenfield (Agent-General for the Province of Alberta), Nawab Sir Umar Hayat Khan, the Hon. T. J. Ley (ex-Minister of Justice, New South Wales), H. A. F. Lindsay (Government of India Trade Commissioner), Edward H. Macartney (Agent-General for Queensland) and Mrs. Macartney, Group-Captain H. R. Nicholl (Directorate of Personal Services, Air Ministry), Miss O'Brien, Handley Page, George Pilcher (Secretary, Royal Empire Society), Earl Russell (Parliamentary Under Secretary, India Office), Colonel The Master of Sempill (President, Royal Aeronautical Society), C. C. Walker (De Havilland Aircraft Co., Ltd.), and Lieut.-Col. E. Murray (Secretary, British Empire League).

Aviation Lighting

THE International Commission on Illumination (Central Offices; National Physical Laboratory, Teddington) is organising an International Meeting to deal with the problems of lighting in connection with aviation. This meeting will be held in Berlin on April 28, 29 and 30, and Delegates from ten European countries, from Japan, and from U.S.A. will be present. The matters for discussion include navigation lights, landing lights, air-route beacons, obstruction lights, aerodrome boundary lights, etc. It is aimed at obtaining standard methods of illumination in all these departments.

AIR TRANSPORT

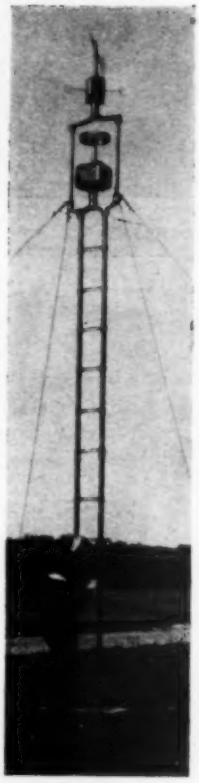
METEOROLOGY AND AIR TRANSPORT

FOG, still the greatest enemy of the navigator on the seas and in the air, is being put under the microscope and in the scientist's test tube at Massachusetts Institute of Technology's new meteorological observatory at Round Hill, Mass. The object of this program of research is to gain new knowledge of the atmospheric conditions which produce fog in its various forms, and to develop methods of forecasting as an approach to intelligent study of the problem of preventing or dissolving fog.

Completion of the meteorological observatory, with its recording room and laboratory, adds another unit in the broad program of research, started several years ago. Technology's research centre on the estate of Col. E. H. R. Green at Round Hill now includes one of the most complete short-wave radio experimental stations in the country, where fundamental studies in communications are being carried on.

To the layman fog is simply fog, but the scientist has classified fog in more than a score of forms, including arctic sea smoke, tropical air fogs, the haze of Indian Summer, early morning mists, the ground fog common in the vicinity of great cities, and many others.

One of the studies under way at this new meterological observatory, first of its kind established by an educational institution, seeks to develop an accurate method of measuring absolute humidity. By this method it is hoped to be able to accurately measure separately the total amount of liquid, water and vapour in the atmosphere.

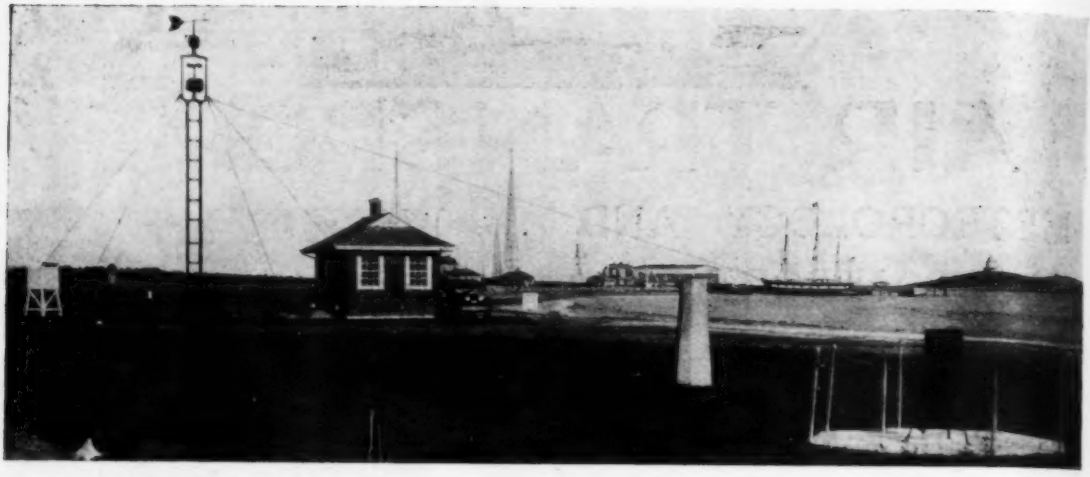


On the right, an instrument for finding the height of the "ceiling." By sighting along the pointer to a spot on the nearest cloud formation, the observer is able to determine the height of the clouds, information of great value in aerial navigation. The instrument on the top of the mast on the left records wind direction, and transmits it electrically to dials in the observatory. Below it is an electrically-operated device which gives instantaneous readings of wind velocity.

The dial on the left gives instantaneous readings of wind direction, while the dial on the right indicates velocity. The anemometer on the table makes a continuous record of wind velocities. Behind it is a barograph which keeps a record of variations in barometric pressure.

The size of the droplets of which it is composed also is to be studied with the object of determining to what degree the size of the drops affect visibility. Another division of the research will make a study of the distribution of temperature in fog and clouds at various heights. These experiments will be carried out with the aid of instruments attached to captive and sounding balloons and aircraft. Determination of the thickness of fog banks is one of the most important objects of the investigation.

Throughout the studies the various physical characteristics of fogs will be correlated with the general weather conditions. It is known that different types of fog have different nuclei, among them particles of dust, around which the droplets form upon condensation, and it is believed that there are great variations in the size and number of drops in various forms of fog. Technology's weather observatory is adjacent to the great Round Hill airport, one of the finest in the country. The station issues daily weather maps for the United States, and distributes forecasts for aircraft operating in the vicinity of Round Hill. Wind velocities, temperature soundings, humidity and pressure observations are also available to aviators. A comprehensive New England weather service is vitally important to the development of American meteorology in the opinion of Prof. C. G. Rossby, who is in charge of Technology's new observatory. The progress of European meteorology in the past fifteen years, he explained, is due to

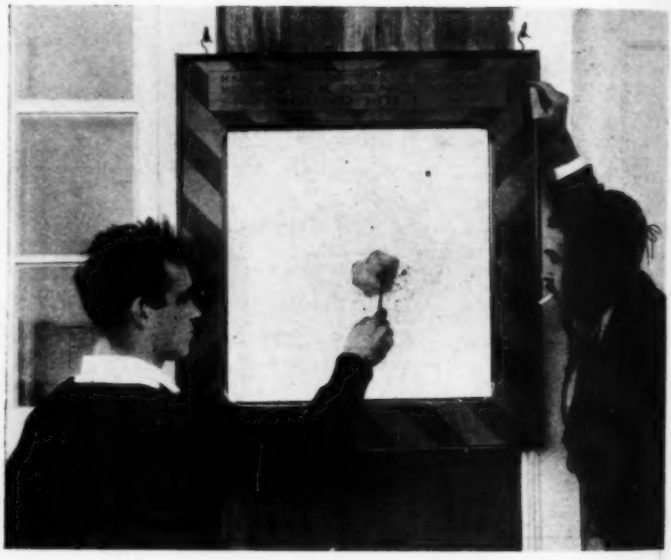


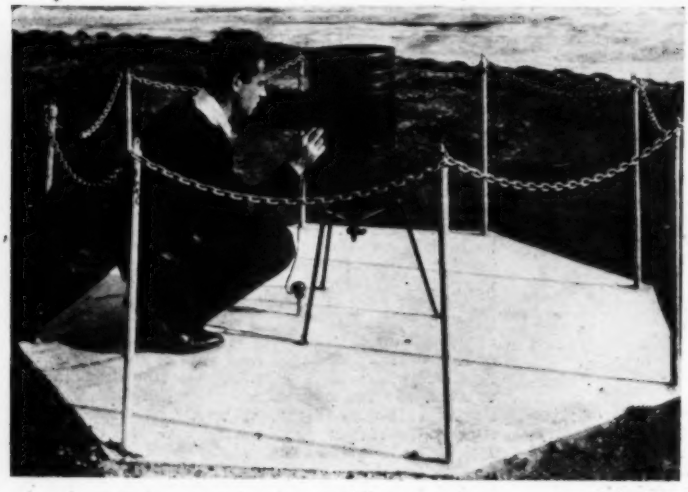
The new meteorological observatory of Massachusetts Institute of Technology on the estate of Colonel E. H. R. Green at Round Hill, Mass. Beyond the observatory lies the great Round Hill Airport.

the introduction of micrometeorology, or detailed observations from an ever-increasing number of weather stations. He believes that some section of the United States characterised by striking weather changes should be set aside for government and private meteorological research.

The work of the meteorological station will be carried on in conjunction with the general program of research being undertaken at Round Hill under the general direction of Prof. Edward L. Bowles. Among the studies now going on is one which concerns the navigation and landing of aircraft in fog, methods of communication between ground stations and airships, and between aircraft in flight. Much data has already been gathered in experiments between the short-wave station and aircraft, but the studies must be carried on for a much longer period before an analysis of the information can be completed.

These studies include the use of special navigation instruments, research in the penetration of light of various colours through fog, methods of accurately determining altitude above the nearest ground rather than sea level, and visible and invisible electrical airport landing beacons.





At the entrance to the meteorological observatory of Massachusetts Institute of Technology at Round Hill, Mass., is posted daily a large weather map of the United States, and comprehensive forecasts, local and national forecasts, for the benefit of aviators operating from the Round Hill Airport. Below is the rain gauge. The instrument operates electrically, registering precipitation in hundredths of inches.

Technology short-wave radio research is developing much interesting information. The work is being carried on almost entirely in short-wave studies because the field of short-wave transmission is virtually unexplored. One investigation in progress concerns the energy loss of radio waves passing over various kinds of soil, sand and the sea, as well as the effects of hills and forests on such waves. Then there is the fascinating study of the behaviour of radio signals travelling over great distances. This work is carried on with the aid of amateur radio operators in almost every country in the world. The research engineers who are carrying on this work want to know what

effect clouds, rain, light and darkness, the season of the year and other atmospheric changes have on radio signals. Their communication with other stations is by the code familiar to amateur radio operators everywhere. In this connection it is interesting to note that nearly all these amateurs can converse in English regardless of their nationality.

Communications on short waves, which include the 10, 20, 40 and 80-meter bands employed in transmission from Technology's Station W1XV, is possible over great distances. The engineers at Round Hill have no difficulty in communicating with amateurs in Australia, Africa and South America, but the conditions with which they have to contend over such distances are far more involved than those which sometimes disturb the broadcast listener.

The static which breaks in on a concert now and then usually is of local origin, but in short-wave communication the flying signals travel thousands of miles, passing from daylight into darkness and into daylight again, and encountering all kinds of meteorological conditions in their passage through space. At this time of year the signals speed out through the cool air of late winter in New England and reach Australia or South America in towards the end of their summer.

A few degrees make much difference. In conversation with the ships of the Byrd Antarctic Expedition with which the Technology Station has been in regular communication, the Round Hill operator may get up at 5 o'clock Monday morning to converse with one of the Byrd ships before the man on board has gone to bed Sunday evening. The research operators at Station W1XV have handled thousands of words of messages between members of the expedition and their relatives or business associates in this country. They range from personal greetings to important business arrangements.

A PRAIRIE AIR MAIL SERVICE

WE show in the above map the route of the prairie air mail service which was recently inaugurated by Western Canada Airways, Ltd. The Winnipeg-Calgary division, which is 728 miles in length, is flown at night, and the Regina-Edmonton division, 499 miles long, is flown by day.

Emergency landing fields have been established at 30-mile intervals along the Winnipeg-Calgary route—which, of course, is equipped with aerial beacons and landing lights. These emergency grounds are indicated in the map by the small single circles, the main stages being shown by larger double circles. Saskatoon and North Battleford are the towns of call on the Regina-Edmonton section.

Western Canada Airways also operates other services, mainly in mining areas, such as The Pas, Lac du Bonnet and Sioux Lookout.

Holland-Dutch Indies Service

THE British Government has given permission to the Dutch Government to use Indian aerodromes for a regular air service between Amsterdam and Batavia. The service will be a fortnightly one.

Brussels-London Night Air Mail

AT 11.30 p.m. on April 14 the new night air mail service between Brussels and London was inaugurated by Sabena, the machine, a three-engined Fokker, arriving just before 2 a.m. the following morning, with 400 lbs. of mails. The outward bound machine left Croydon at 1 a.m. and arrived at Brussels at 3 a.m. Sir Sefton Brancker, Director of Civil Aviation, who flew to Brussels on April 14, took part, together with M. Lippens (Belgian Minister of Transport), in the inaugurating ceremony, which was preceded by the unveiling of a memorial to Maj. Nelis, a pioneer of Belgian aviation.

The Postmaster-General announces that this service will run nightly except on Saturdays and Sundays. The latest time of posting at the General Post Office, London, will be 11 p.m. and the mail will reach Brussels in time for the first delivery. The latest time of posting in the Provinces should be ascertained locally. This service offers a much later time of posting in London than the ordinary service to Belgium and a considerably earlier delivery. All classes of postal packets (except parcels) may be sent; and registration, but not insurance, is admitted. An air fee of 2*d*. per ounce must be prepaid, in addition to ordinary postage. Letters should bear the blue air mail label in the top left-hand corner, and may be posted in the ordinary way. There is a corresponding service from Brussels to London and mails by that service should obtain the first delivery in London Head Districts, and second delivery in other parts of London.

Air Mails to India

THE Postmaster-General draws attention to the fact that Air Mail letters addressed to places on the North Western Frontier of India and in Baluchistan, and in particular to Razmak and Quetta, should be prepaid at the lower fee of 5*d*. per ½ oz. in addition to ordinary postage, and not at 7*d*. per ½ oz. plus ordinary postage, which covers air transmission from Karachi to Delhi. The latter service offers no advantage to letters for the destinations in question as compared with transmission by ordinary route beyond Karachi. The public are also reminded that all Air Mail letters for Iraq should now be posted on Fridays for transmission by the direct Indian Air Service, the air fee being 3½*d*. per half ounce in addition to the ordinary postage. The Air Mail is due at Baghdad on the following Tuesday evening, and at Basra on Wednesday morning.

AIR POLICY IN THE HOUSE OF LORDS

ON April 9 Lord Trenchard made his maiden speech in the House of Lords and asked the Government for a statement of policy and to move for papers.

LORD TRENCHARD pointed out the rapid increase in the size of the air forces of foreign Powers. The first-line strength of the Great Powers was as follows:—France, 1,300 machines; Italy, 1,100; America, 900; and Great Britain, 770. Surely that fact required very earnest consideration. He thought we were becoming, if we had not already become, as dependent for our very existence on the Air Service as we had been in the past, and indeed still were, on the Navy. He asked the Secretary for Air what was the policy of the Government, particularly with regard to that home defence force that was sanctioned in 1923. Was that to be gone on with? He felt certain that, as long as Lord Thomson was Secretary for Air, he would be no party to one-sided disarmament. He could not deal with the second part of his question without touching on air development since the war. The pilots and mechanics in the last war built up the finest air fighting machine in the world. It was built up to deal with the menace of the enemy we then had to face. British characteristics were given the fullest play. But when the war was over the question arose how to organise the Air Service. It appeared to those with whom he served and worked in those days that if the only way they could use the Air Force was against the enemy's force, then it simply meant through the long years of peace, superimposing the expenditure on the Air Force on the already heavy expenditure on the Navy and the Army. They thought, therefore, that the Air Service would have to take over some of the humdrum responsibilities of peace. Mr. Churchill, who was then Secretary for Air, suggested that the Air Service should take over the responsibility of keeping peace and order in Mesopotamia. The Air Staff willingly accepted the responsibility. They thought that if full use was made of the mobility and moral effect of the Air Force it could keep order in those wide spaces. There were no railways and roads to make and no convoys to be cut off. Many tribes fought for fighting's sake. Some of them had no objection to being killed if they could only kill others and take from them a rifle, some domestic article, or their boots. But they did not like fighting in which they might lose things themselves and have no chance of getting those which belonged to somebody else. The Air Force could move so rapidly when disturbances occurred a long way off that there might be no need to drop a single bomb. The moral effect of the mere appearance of the aeroplane was sufficient to stay the trouble. What the Air Force felt was that if it could be used quickly in far-distant places it might stop trouble instead of having to wait, it might be for several months, for a ground expedition to be prepared. Was it possible for the Secretary of State for Air to give information as to the number of cases where the mere appearance of aeroplanes had done the work of pacification? It had been said that the bomb was a most inhuman weapon, but his submission was that it was not more brutal than other forms of warfare, and all warfare was brutal.

Lord Trenchard gave instances of air operations on the North-West Frontier, in Iraq, and Aden, and compared them with ground operations which had been carried out in the same territories, the conclusion he drew being that, in the length of time occupied, the number of casualties suffered by the British forces engaged, and the financial cost, those conducted by the Air Force were far more favourable than those carried out by military forces. He asked the Secretary of State for Air whether it was not possible to have an inquiry, in order to see what other responsibilities in peace time could be taken over by the Air Force, and also to see which would be the most economical and effective in both money and life. What about the frontier of India—though that was a matter for the Government of India—what about the Persian Gulf, the Red Sea, the Sudan, and other places? If the two considerations of economy in money and economy in life were not satisfied, then there was no justification for making any alteration in the existing system.

EARL BEATTY said that Lord Trenchard had asked that there should be an investigation into the question whether the Air Force could take over certain duties, among which he enumerated those in the Persian Gulf and the Red Sea. The duties in those two places were to-day performed by the Royal Navy. If the Air Service could take over those duties he assured the House that there would be great rejoicing in the Navy. The duties were principally concerned with the restriction of the slave traffic and the arms traffic. Those were things which could only be controlled by naval forces. Dhows had got to be stopped, boarded and examined, and if guilty they had to be towed into port. Those dhows often flew flags of various countries, and it was essential, before any untoward action was taken to ascertain whether they were guilty, otherwise there would be an international incident of a regrettable character. That could only be done by stopping the dhows. It was a simple matter for a sloop to run alongside a dhow and force it to stop, but flying-boats could not do it without the risk of grave damage, of destruction, or of being rendered useless by the purposely clumsy handling of the dhow. Among other duties which the Navy had to perform in the Persian Gulf was looking after political representatives and providing accommodation for the native authorities. A flying-boat could carry a man a great distance, but it could not provide the accommodation needed.

There was such a thing as showing the flag, which was a very important service. It consisted of exchanges of courtesies, hospitality, and receiving authorities on board. Aircraft could not exist in the Persian Gulf without having ships to assist them. There were all sorts of duties performed by H.M. ships which could not be done by aircraft. There were operations which necessitated ships remaining in a port where trouble was likely to occur for a period of weeks. On many occasions the actual presence of a sloop had prevented a disturbance from arising. That was a duty which the Air Force could not do. Most important of all was the fact that for nine months in the year the weather conditions in the Red Sea and the Persian Gulf were such that flying-boats could not alight on the water. Therefore for nine months in the year the traffic in slaves and arms would continue uninterrupted if the Air Force took over the duties performed in that case by His Majesty's Navy.

THE EARL OF CAVAN said Lord Trenchard had raised a question of vast strategical importance, which dealt not only with the control and policing of the territories in the Middle East for whose well-being Great Britain was responsible, but with our intimate relations with the peoples of those countries. He would have thought that a question of pure strategy such as this was should first have been submitted to the Committee of Imperial Defence by Lord Trenchard when he was in the chair which he filled so ably as head of the Air Force for 10 years. Then the Committee of Imperial Defence would have referred a question of this sort, which closely affected the whole of the three Services, to the sub-committee of the chiefs of the staff, who would have made some recommendation, and that after that it would have been a subject for debate.

THE MARQUESS OF LONDONDERRY said that it was very gratifying to note the spirit of harmony which existed between the three Services. He was somewhat alarmed by the opening remarks of his noble friend with reference to the strength of the first-line in air forces, and he asked the Secretary for Air if he could give them some information on these important matters. The expenditure which was at present being lavished by various countries on their air forces was a matter—he would not say of disquietude—but a matter worthy of discussion. The programmes of France, Italy, and the United States all showed, he thought, a considerable expansion. They also showed a further increase in disparity rather than a movement towards parity. Could any information be given whether these programmes were likely to be completed? He felt that there were activities possible to the air force in which its employment would be of a more humane and efficacious character than that of the other forces.

VISCOUNT PLUMER said he had listened with the deepest interest to the able statement which Lord Trenchard had made regarding the achievements of the Air Force and its progress and propounding certain proposals with regard to future development. The record was a fine one and was of itself a great tribute to Lord Trenchard, and the work which he had done during the many years he was Chief of the Air Staff. All the officers of the Army appreciated the splendid service which he had rendered to the Army, but he endorsed what the Earl of Cavan said when he expressed surprise that this great matter had not been in the first instance submitted to the Committee of Imperial Defence, where it would have been considered, and reviewed from all points by the Chiefs of the Naval and Military Staff and the other members who were the responsible advisers of his Majesty's Government.

He was not a member of the Committee of Imperial Defence, but he was one of the senior officers of the Army and from experience he could not allow certain of the claims put forward by Lord Trenchard for the Air Force to pass unchallenged. He did not propose to enter into any discussion as to the particular role that should be allotted to the Air Force in case of war. The point to which he wished specially to refer was the claim that measures for public security and the maintenance of order and the prevention or repression of disorder in certain parts of the Empire should be handed over to the Air Force. In his opinion, the character and nature of the Air Force did not render it the most suitable force to perform those duties. The Air Force was admittedly and essentially an offensive force. Its power lay in its mobility and all the advantages of that mobility and in its ability to strike quickly and strike hard. But the many parts of the Empire, especially the distant parts, that had been acquired in the first instance by force of arms had been and were being consolidated and pacified by a constant daily association and contact with the officers and men of our Forces. The Air Force could not possibly maintain such daily contact and association. It was quite true that they could visit, and no doubt had visited, distant localities from time to time, but then they were regarded only as visitants, and the ordinary method of keeping in touch was the sending of an aeroplane to circle over those places. That was taken by the inhabitants as a threat—quite an effective threat, of course, because they knew full well the power that lay behind it—and a threat which produced, as Lord Trenchard had said, passive acquiescence in authority. But if they were to make these people contented, happy, and actively loyal, they must inspire them with some higher and deeper feeling than passive acquiescence in our authority.

The principal punitive power of the Air Force lay in bombing. Bombing was a most effective weapon for dealing with raids, aggression across a frontier, and so forth, but if applied against the civil population, taking the form of the destruction of villages and habitations, it was, he considered, a mischievous power. Those were the two reasons why he considered that the Air Force could not possibly succeed in true pacification.

Special attention was paid to the claims of the Air Force on the ground of economy. Certainly the figures that he had been able to see and to hear were very attractive, he might almost say alluring, but true economy must not be gauged by actual figures, but by the value which those figures represented. It was false economy to incur any expenditure for the maintenance of public security unless it was quite certain, humanly speaking, that the measures adopted would be such as to ensure permanent pacification or, at any rate, a basis for it.

LORD LLOYD said he would like to take this opportunity of associating himself, as one who had lived alongside the Air Force in two different parts of the world for the last twelve years, with the tribute that had been paid to Lord Trenchard and to the work that he had done for the Air Force. No one who had seen much of the Air Force, of its spirit, and of the gallantry of its officers and men, could fail to feel that its existence in its present condition was a monument to the zeal, courage and enterprise of the noble lord who opened this debate.

Lord Trenchard had indicated that the North-West Frontier of India was an area in which the Air Force could be used in place of ground troops. That claim filled him with grave alarm. For 70 years we had tried to rule the North-West Frontier by indirect means. The Army was merely used as a weapon to mete out punishment for raids. In 1919 matters came to a head, but meanwhile the Government of India had learned its lesson. The area was penetrated with great military roads. Ever since we had adopted that policy of control from within our policy had been one of civilisation and pacification, and no better justification of that policy could be found than in the effects we were now witnessing. The most important element in the success of that policy was the direct contact between British officers and the heads of the tribes. The British occupation and peaceful penetration had put a stop to all raidings. Whereas the old system of punitive expeditions left behind a legacy of hatred and created a desire for revenge, now the presence of our troops was welcomed on all sides.

Therefore he argued that the proposal to substitute Air control for Army control on the North-West Frontier involved a complete reversal of their pacific policy. The proposals to which the House had listened involved a reversal of our traditional policy in handling those people. To advocate the substitution of what inevitably must mean an impersonal and inhuman agency, whose only weapons, however valuable in war, could be intimidation and punishment, for the personal, human agency of the administrator, with his free intercourse with those peoples, would have a most damaging effect on our repute all through the East.

LORD GORELL said that the House could congratulate itself that, for the first time for many years, it had heard at first hand the opinions of those who were the leaders and the great brains of the three Services. Lord Trenchard had put forward no claims for the Air Force; he had dealt with facts, and had asked for an inquiry. Lord Lloyd on one point had rather misapprehended what Lord Trenchard had said. Lord Trenchard had not suggested that the Air Force should be put forward as the administrator as against the civil administrator, but rather that if punitive measures were called for it might be possible for the Air Force to operate more economically and humanely than bodies of troops on the ground.

EARL PEEL said that it was very natural and right that a comparatively young force like the Air Force should wish to re-examine at different times its relations with the two older Services. This was primarily a question for the Government of India, but very grave consideration should be given before

any substantial alteration was made in the method of administering the forces or in the Commands on the North-West Frontier.

LORD THOMSON, Secretary for Air, having associated himself with the tributes paid to Lord Trenchard, said he did not regard air power as consisting exclusively of air forces. The function of the Air Ministry as he conceived it, and the justification for its separate existence, was that it was there to develop air power, and the three principal elements in air power were: An Air Force of sufficient size to carry out the policy of the country; air communications sufficiently developed and an air transport system corresponding to the mercantile marine; and, last but not least, a highly developed system of aeronautical research. Those three elements in air power were absolutely indivisible. It was no small tribute to the judgment of our Government and of our race that as long ago as the later stages of the War we established an Air Ministry and confided to it the development of air power in that extended sense.

The Air Estimates represented to some extent the air policy of a country, though not altogether, and, as the person responsible for our own Air Estimates, he could say that they did nearly fulfil the heart's desire of his advisers. They amounted to a slight increase—perhaps more than a slight increase—on air defence; in proportion, a slightly greater increase on air communications; and a very slight increase on research.

The cost of air defence had gone up. The increase in the size of the Air Force had been very slight. The Air Force in France had gone up or was going up this year—and he saw no reason why the programme should not be carried out—by four squadrons. The Air Force in America was being increased by four and a-half squadrons. If we had followed exactly the programme laid down in 1923 the increase in our Air Force would have been, say, three squadrons, and it was not as great as that this year, not even on home defence. He might probably be called upon to justify that action. We kept the Air Force in this country to defend ourselves and our shores against attack by Continental air forces, which were the only forces within striking distance by air. How could that be done? He believed that the policy which should guide the Government in that respect was to provide a sufficient Air Force that was a force of sufficient size and efficiency to act as an adequate deterrent to any hostile Government. Up to date, he was sorry to say that no means of purely passive defence had yet been devised for dealing with an attack by air. Some people held contrary views, but he had never heard them meet the real case—a surprise attack. He had not the least doubt that devices could be put up which would make it extremely difficult for an attack by air to be made, but he doubted even these being entirely effective against a surprise attack. In any case they could not be put up all over the country. The defence was reprisals—that was the terrible part about air warfare—and the interception to some extent of the attacking aircraft. He wondered whether, in view of the efficiency and equipment of our Air Force, it really would appeal to any foreign country to drop a bomb upon this island. He thought he could assure the House that the Air Force of to-day was, so far as human foresight and equipment could make it so, an adequate deterrent.

If the Air Force were twice the size he did not know that it would be more adequate. Personally, he would set his face strongly against a considerable addition to its numerical strength at the present time in view of the general political situation. Note had to be taken of the call for economy, and nothing got out of date quicker than aircraft. In view of the general political situation and of the efficiency of the Air Force as a deterrent, he thought it would be a waste of money to pile up armaments because of some idea that they would make us safer against Continental Powers. That was not his conception of security. He did not believe in security which was based solely on force. He believed in security based on political conditions, and though he was the last to deny that there was a limit below which it would be unwise to fall, he was prepared to justify the very slight increase in the size of our Air Force this year for the reasons he had given.

It might be asked on that why he increased expenditure. It seemed to him that no steps should be neglected and no pains spared to avoid any possible jeopardy to the lives of our airmen owing to shortage or inferiority of equipment. The extra money had been devoted to bringing the equipment up to date, making good shortage, and to ensuring, so far as was humanly possible, that no pilot in the Air Force should lose his life through inadequate equipment or through a lack of the most highly developed research with a view of making flying safe.

What Lord Trenchard asked for was an inquiry. No Government which was confronted with a proposition which might ensure economy without sacrificing security could fail to give the most careful consideration to such a proposition. The Government were not committed to doing anything at once, either on the North-West Frontier of India or anywhere else. All the noble lord asked for was an inquirv, and the Government were at this moment giving the matter their most careful consideration. The Prime Minister himself was taking an active part in the matter as head of the Committee of Imperial Defence. Their lordships would be kept adequately informed of the progress of the investigation, for up to date it was nothing more. It had not yet started as an investigation. He was surprised that Lord Cavan, who had seen so much of war, should still believe that one could humanise it. Without admitting that a bomb was more cruel than a shell, he believed they would never make war anything but terrible. Possibly the most insidious way of prolonging war as a means of settlement between nations was to endeavour to make it a gentlemanly occupation. It must always be a brutal and bloody thing, unlimited and unscrupulous. If the bomb acted as a deterrent, and he thought it did, he should have said that that was an added reason for the employment of the Air Force. He did not think any remark had struck his colleagues and himself more, coming from a man of war, than the remark made by a certain distinguished Air Vice-Marshal who was sent out on special duty the other day to the Middle East, and a disturbed area. "I shall feel," he said, "that I have failed if I drop a single bomb on human beings."

Reference was made by his predecessor in office, Sir Samuel Hoare, in another place as to the disarmament of Air Forces. He supposed it would be possible to limit Air Forces, though it was very hard to get agreement on these things. The present Government, or, he was sure, any future Government, would gladly welcome some arrangement for the limitation of Air Forces. We, in that respect, had acted with a moderation which was an example to mankind. We had never claimed a one-Power standard even in our air policy. At the present moment we were the fourth strongest Power in the world. We had not got parity. The policy of the present Government had been to avoid, as far as possible, and as long as possible, a disastrous race in air armaments. He did not think they had lost any prestige or influence as a consequence. They certainly had a clear conscience in that respect before the world.

But while they could limit Air Forces, they could not limit air power. Consider the state of Europe to-day: Germany building up the foundations of air power in a large air transport system; France, with a similar administration to ours, a large Air Force and commercial aviation together. Italy working on the same lines. It was difficult to say which of those countries was strongest in regard to air power. But in aviation one had got to look at least 10 years ahead. When people talked about disarmament he believed that here was one of the biggest problems that lay ahead. What was certain was this: they might increase their Air Force at the expense of their other Departments, but this was not a departmental matter, it was a national, a European matter. Whatever they did, they were not going to stop the development of aviation. It was one of the greatest and most complicated problems that lay ahead to consider how they could so restrain the development of Air Forces or so organize themselves that the abuse of aviation should be no longer possible. His own view was that no country could possess air power that was not a progressive and highly developed country. The countries which could possess air power were very few in Europe. They were the most democratically governed, and, therefore, the most likely to wish to avoid the disaster of another war. But without their political co-operation and agreement there was no prospect of disarmament in the strict sense in regard to air matters. It could only be with their agreement that the nations possessing air power would be able to say to those which were more backward: "We have got the air power. You may have an air force, but you are not going to abuse aviation. These things shall not be." The motion for papers was withdrawn.

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A LIGHT AEROPLANE METAL AIRSCREW

AN interesting light aeroplane development is the series of light aeroplane metal airscrew evolved by Metal Propellers, Ltd. Many of these are now in use—one has done 300 hours on a Moth and is still as perfect as the day it was new—and as the firm built their first metal airscrew in 1917, this new type may justly be described as tested out.

The advantages claimed for this type of airscrew which embodies hollow steel blades of biconvex section, are many. The blades are, of course, durable, free from corrosion and do not warp. These airscrews are also generally found to be smoother running, probably due to the exceptional freedom from "flutter" afforded by the hollow bi-convex section. Another advantage is that the blades are rapidly adjustable as a pitch, enabling the owner to modify his airscrew according to whether he needs maximum rate of climb, maximum air speed, or intends to operate his aircraft from a tropical aerodrome. A further advantage claimed is lightness. The "Cirrus" model weighs 23½ lb. complete with hub. If a spare is desired, the owner need carry only one blade, instead of a complete airscrew.

It is not specifically claimed that at any particular pitch this airscrew is more efficient than its wooden competitors, yet actual trials here and on the Continent have shown a slight advantage in its favour.

The construction of the blades is identical with that originally evolved by Metal Propellers, Ltd., for large airscrews. Each blade is built up of two composite laminated sheets of S.3 grade steel, one forming the pressure and the other the suction face. Only the outer lamination in each sheet extends the full length of the blade. The blade is formed by welding the two sheets together along the edge. The bi-convex section does away with the need for any internal strutting.

A model has been evolved for both the "Gipsy" and the "Cirrus" engine, and the makers are at all times willing to give demonstrations to persons interested.

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Banquet to Lord and Lady Wakefield of Hythe

THE Royal Aeronautical Society, The Royal Aero Club, Air League of the British Empire and The Society of British Aircraft Constructors will give a banquet followed by a dance in honour of Lord and Lady Wakefield of Hythe, at the Savoy Hotel, London, W.1, on Thursday, May 15, 1930, at 7.30 p.m. for 8 p.m. Brig.-Gen. The Duke of Atholl, K.T., G.C.V.O., D.S.O., President of the Royal Aero Club, will preside.

Lord Wakefield's services to aviation have been such that it would be impossible to do more than barely outline a few of them here. Nearly every Light Aeroplane Club in this country has been supported by Lord Wakefield, who has in addition given aeroplanes to clubs throughout the British Empire, in Canada, India, New Zealand, New South Wales, East Africa, Singapore, to mention only a few. To the Royal Air Force he has given the Wakefield Scholarships, to the Royal Aeronautical Society the Wakefield Gold Medal, and a substantial donation to the Society's Endowment Fund. He has given innumerable cups and trophies for flying, large sums to the Royal Aero Club's Racing Fund and to the expenses of the Schneider Trophy Contest, and has financed many world pioneering and survey flights. His most recent encouragement of aviation has been the gift of £1,000 to the British Gliding Association.

THE GUILD OF AIR PILOTS AND AIR NAVIGATORS OF THE BRITISH EMPIRE

First General Report covering the period from October, 1929, to March, 1930

COURT OF THE GUILD, 1929-1930

Master.—Air Vice-Marshal Sir Sefton Brancker, K.C.B., A.F.C.

Deputy Master.—Sqd.-Ldr. Ernest L. Johnston, O.B.E., A.F.C.

Wardens.—O. P. Jones, Esq., Capt. A. G. Lamplugh, Capt. Norman Macmillan, M.C., A.F.C., A.F.R.Ae.S., A. S. Wilcockson, Esq.

Members of the Court.—Flt.-Lt. G. H. Allison, Lieut.- Cdr. N. G. Atherstone, A.F.C., Capt. J. B. L. H. Cordes, Flt.-Lt. H. D. Davis, F. Dismore, Esq., Order Leopold II (Belgium), Capt. E. L. Hope, F/O. H. J. Horsey, F/O. E. A. Jones, Capt. Charles R. McMullin, C. A. Pike, Esq., A.F.R.Ae.S., The Rev. P. Donald Robins, A.F.C., Col. the Master of Sempill, A.F.C., F.R.Ae.S., Capt. F. Tymms, M.C., Chevalier de l'Ordre de la Courounne, Croix de Guerre, A.F.R.Ae.S., L. A. Walters, Esq., Sir Arthur Whitten-Brown, K.B.E.

Clerk.—Lawrence A. Wingfield, Esq., M.C., D.F.C.

Hon. Chaplain.—The Rev. P. Donald Robins, A.F.C.

Hon. Auditor.—Ernest Harry Wingfield, Esq., F.C.A.

The Guild nominally came into existence on October 1, 1929. It arose out the general desire expressed at an informal meeting of Air Pilots and Navigators held on February 1, 1929. The preliminaries of drafting the rules and preparing a scheme by which a duly elected court could be brought into existence which could in turn proceed to the election of members, were all matters requiring the greatest care and attention, and fully occupied the succeeding seven months. For all the patient work involved therein thanks are due to so many that it would perhaps be invidious to mention names, but one is bound to record a tribute to the whole-hearted and loyal energy and foresight displayed by Sqd.-Ldr. E. L. Johnston, and to say that the existence of the Guild is very largely due to his efforts. One would also like to record appreciation of the good counsel and ready interest of our first master, Air Vice-Marshal Sir Sefton Brancker, K.C.B., A.F.C., who, notwithstanding his innumerable other activities, has always been ready to lend a sympathetic ear to pilots' difficulties.

The election of the court took place at the meeting of the foundation council on October 7, 1929, and can be said to be the first official act of the Guild's existence.

On October 19, 1929, the ceremony of installation of the first master, deputy master, wardens and members of the court was performed by the chaplain and clerk at the Hotel Cecil in the presence of the members of the Guild.

This ceremony was followed by the inaugural dinner at which 120 persons were present. The dinner was held in the large banqueting hall of the Hotel Cecil. Among the guests were many of the leading men and women in the aircraft industry and the Air Force, the principal guest being His Majesty's Under Secretary of State for Air, Mr. F. Montague.

Six months have elapsed, and it is now possible to give a review of the work undertaken and accomplished during that period.

COMMITTEES.—The following committees have been set up : *Finance :* Sqd.-Ldr. E. L. Johnston (chairman), Capt. O. P. Jones, F/O. H. J. Horsey, Capt. W. L. Hope, C. R. McMullin, Esq., Commdr. N. G. Atherstone, A. S. Wilcockson, Esq., Rev. P. D. Robins, Capt. Norman MacMillan.

This committee meets regularly each month prior to the monthly meeting of the court.

Accident : Capt. N. Macmillan (chairman), A. S. Wilcockson, Esq., O. P. Jones, Esq., Capt. A. G. Lamplugh.

This committee was appointed with the object of considering flying accidents from the pilot's point of view.

No committee of inquiry has ever been held by competent air pilots in the past, indeed the machinery for instituting such a committee did not exist.

The object of this committee is to determine whether the risk to life of pilots and passengers in air transport is unduly great, and what steps if any can be taken from the pilot's point of view to eliminate risks. It is not intended to examine any specific accident, but merely to collate the practical experiences of members.

The committee is still sitting and will report on or before June 30, 1930.

THE GUILD IN RELATION TO OTHER AERONAUTICAL BODIES.—It is of interest that a resolution was passed by the Royal Aeronautical Society on November 19, 1929, approving the application of the Guild of Air Pilots and Air Navigators of the British Empire for recognition as the body primarily concerned with the welfare of commercial pilots.

A similar resolution was shortly afterwards recorded by the Air League of the British Empire.

LEGAL REPRESENTATION.—One of the most important matters that early arose for consideration by the Guild was the question of legal representation of the Guild and its members at inquests and courts of inquiry. It has been laid down that in the case of members legal representation be taken by the Guild at all inquests and inquiries, and that in the case of non-members the Guild should be legally represented in all cases where it is conceived a point of policy or principle affecting the members of the Guild is concerned.

As it is sometimes necessary to take decision upon a matter of this kind with great urgency, the master, treasurer and clerk are empowered to incur a limited expenditure in the first instance without the consent of the court.

CONTRAVENTION OF AIR NAVIGATION REGULATIONS.—The attention of the court was called to the fact that very often low flying over towns involving breaches of A.N.R. was deliberately undertaken for commercial gain. One occasion in particular was reported, in which three different newspapers requested aerial pictures of the R. 101 flying over London on October 14, with the Thames and Houses of Parliament in the background of the picture. This request was declined by the member to whom it was made upon the ground that this was a dangerous thing to do with a single engine machine, and furthermore was strictly against the Air Navigation Regulations in force. Nevertheless another firm (not members of the Guild) took the pictures which were duly published in the papers, to the financial disadvantage of the member concerned.

The court expressed the view that such breaches were to the detriment of the Guild as being calculated to bring the professions of air pilot and navigator into disrepute, and communicated their view to the Air Ministry expressing, on behalf of the members of the Guild, their desire to see the regulations strictly observed. The Air Ministry have now invited members to report to the Guild any cases of contravention of the regulations that may come to their notice. The registration markings of the aircraft should be noted to enable the machine to be identified and the Air Ministry will then take appropriate action.

SOCIAL ACTIVITIES.—In January, the Guild were able (through the courtesy of Mr. Alexander Duckham) to arrange for a private exhibition of M. Louis Bleriot's Film " 25 years of Aviation," which was attended by about 100 members and friends, and was greatly appreciated. Mr. Duckham has also expressed his desire to present the Guild with a " Loving Cup " to start its collection of plate. A suitable design has now been selected, and the Guild will receive the cup shortly.

NAVIGATION CLASSES.—Through the enterprise of Capt. A. G. Lamplugh, the Guild has held throughout the winter a successful course of navigation classes.

These classes have been so popular that many more applicants applied than could be catered for, and it has been found there is a widespread demand for similar classes in the provinces. Endeavours are being made to arrange to meet this demand.

The court has recently had under review the whole question of present day methods of education and training for commercial pilots, and has been asked to submit to the Air Ministry a memorandum embodying its views.

We desire to record our grateful thanks to Capt. A. G. Lamplugh for all the work he has done in this connection.

COAT OF ARMS.—The question of an heraldic coat of arms for the guild has been under consideration for some time, and a suitable design has been prepared and approved by the College of Heralds. Owing, however, to the expense entailed for the College of Heralds' fee (the total expenses are estimated at approximately £250) the matter has been left in abeyance—for the time being.

CONVENTION FOR THE UNIFICATION OF AIR TRANSPORT dated October 12, 1929.—The court has had under consideration the convention above referred to from the pilots' and navigators' point of view.

The court are also considering certain proposals made by Dr. Herman Doring to the International Law Association, the chief of which is that in the event of temporary forced landings of International Air Transport, the obligation of the pilot to communicate with the customs authorities should be waived where the cause of the landing can be quickly located, and that in the event of longer delay the pilot acting as representing the competent customs authority, can effect a provisional customs examination and seize such articles as in his opinion are subject to customs duty. The court expressed their approval of these proposals, and informed Dr. Hermann Doring and the International Law Association.

RENEWAL OF B. LICENCES.—Certain complaints of pilots with regard to the expense of outside medical consultation in connection with the renewal of "B." licences have been made. The court has taken the matter up and anticipate to be able to achieve an improvement from the pilot's point of view in this connection.

ASSOCIATE MEMBERSHIP.—In February a committee was set up to explore the possibility of associate membership. The committee recommended the proposal subject to limitations which they mentioned. In considering the class of person to be admitted as an associate member they thought that

(*a*) He must be a British subject;
(*b*) He must be engaged in commercial aviation.

The committee were of opinion that the applicant should be definitely, though not necessarily earning his livelihood as a pilot or air navigator.

They further recommended that an associate member should have no vote in the management of the Guild and should pay a subscription of £2 2*s*. per annum. The report of the committee came before the court on March 11, who, however, came to the conclusion that the time was not yet ripe and resolved that the matter remain in abeyance for 12 months.

PILOTS' AIR NAVIGATORS INSURANCE against loss of Certificates or Licences.—The Guild has for some time past had under consideration the question of an approved policy protecting pilots and navigators against loss or suspension of their licence and possibly their livelihood.

Such a policy would provide for weekly payments during suspension, and a lump sum in the event of the Secretary of State refusing to renew the licence.

The Guild are engaged, in conjunction with underwriters specialising in this class of insurance, in getting out an approved form of policy, and are assured that it will ultimately be available to members at a premium less than that payable by non-members for similar benefits.

Further details will be issued in due course.

INCOME TAX.—The Guild has resolved to afford financial support to one of its members who, on behalf of himself and many other pilots, is fighting a test case. One of the principal contentions involved in the case, which is being brought against the member by the Crown by way of appeal from the decision of the Special Commissioners already given in the member's favour, is the question of allowance of the cost incurred by a pilot for running of motor-car to get him to and from his place of starting work. The contention of the pilot is that he cannot be said to have his place of business at any particular aerodrome, seeing that all aerodromes served by the air line employing him are equally places of business. His case, therefore, being different from that of an ordinary employee (who has a fixed place of business) and a motor-car being essential by reason of his never knowing when he may be called upon to start work, the cost of his motor-car ought to be allowed for income tax purposes. While this question probably affects only pilots employed by an air line, the Court have considered it of sufficient importance to justify their support. There are also involved in the case several other questions of even more general application to pilots.

5TH INTERNATIONAL AIR CONGRESS AT THE HAGUE.—The Guild has been invited to send delegates to this Congress. It is greatly hoped that a member or members will read papers upon the subject of air transport from the pilot's point of view, and the master is of opinion that such a paper would be of great value. The papers must be submitted to the Secretary-General of the Congress on or before April 30, 1930, and any member willing to do so should communicate with the Clerk to the Guild as soon as possible.

ENDOWMENT FUND.—The court has resolved to set up an endowment fund with the object of

(*a*) Charitable assistance to widows and orphans of members in cases of need.
(*b*) To provide the Guild with an income independent of subscriptions.
(*c*) To provide for legal representation of the Guild and members at inquests and courts of enquiries into air accidents, Parliamentary enquiries, etc.

A donation of £50 has already been received.

LAWRENCE WINGFIELD, M.C., D.F.C.,
Clerk to the Guild.

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AIRISMS FROM THE FOUR WINDS

The Prince Flies to Khartoum

THE Prince of Wales arrived at Khartoum on April 3 after an extremely bumpy flight, in the face of a strong wind, from Malakal, a stop being made at Kosti of one hour. The 400-mile flight was made in six hours, and the Prince was escorted by seven R.A.F. machines. His aeroplane was piloted by Flt.-Lt. A. B. Bowen-Buscarlet. At Khartoum the Prince was met by Sir John Maffey, Governor-General of the Sudan.

The Duchess of Bedford's Flight

AT dawn on April 10 the Duchess of Bedford set out from Lympne for Africa in her Fokker monoplane *Spider* (fitted with a Bristol "Jupiter" with special Farman reduction gear), piloted by Capt. C. D. Bannard and with Mr. R. Little as relief passenger. During the flight the Duchess, who made her first solo flight (in a D.H. "Moth") on April 8, will also take a turn at the controls. Calling at Le Bourget *en route*, they landed at Oran, Algeria, at 5.50 p.m. the same evening, having experienced bad weather during the trip. At 6.15 a.m. the next morning the flight was continued to Tunis, which was reached at 2.30 p.m. Proceeding at 6 a.m. the following morning, April 12, Benghazi was reached at 5.30 p.m. They left again at 5 a.m. on April 13 and arrived at Assiut at 2.30 p.m., left Assiut at 5.45 a.m. on April 14, arriving at Khartoum after 8½ hours' flying.

The R 100

THE airship R 100 is to make a voyage to Canada next month, provided she proves satisfactory in the trials which are to be made soon after Easter. She will carry neither unofficial passengers nor mails, but it is likely that Lord Thomson, the Air Minister, will make the journey in the airship. She is expected to fly from Cardington direct to the mooring mast at St. Hubert, Montreal, and as this will be in the nature of a trial she may take more than the estimated time of two and a half days, based on her average cruising speed. Major G. H. Scott, who had charge of R 34 when she made her voyage to America and back in 1919, will be in command of R 100.

Graf Zeppelin

IT is reported from Cologne that the Graf Zeppelin will make a flight from Friedrichshafen to Bonn and return on April 22.

Mr. Alan Butler at Bulawayo

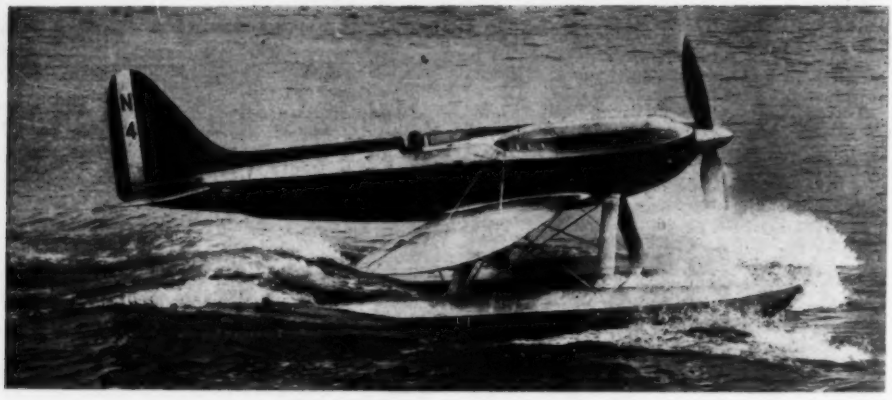
MR. ALAN BUTLER who, with his wife and a mechanic left Heston on March 20 in the Gloster Survey machine (Bristol "Jupiters") for Africa, arrived at Bulawayo, the Air Survey Co's headquarters, on April 10. He flew on south later, arriving at Johannesburg on April 13 and leaving again for Cape Town the following day.

Costes' Atlantic Flight

ACCORDING to the *Morning Post* Paris Correspondent, Capt. Costes, the French air "ace," is now making definite preparations for his long meditated flight from Paris to New York. The start may be made any time after May 15, the beginning of the favourable season.

An Aerodrome for Deauville

As part of its preparations for the summer season, Deauville is making plans for the laying out of an aerodrome, a site for which has been selected at St. Gatien, some three miles from the beach. Regular air services between Deauville, London and Paris are being planned.



THE SUPERMARINE S.6. (FLIGHT *Photo.*)

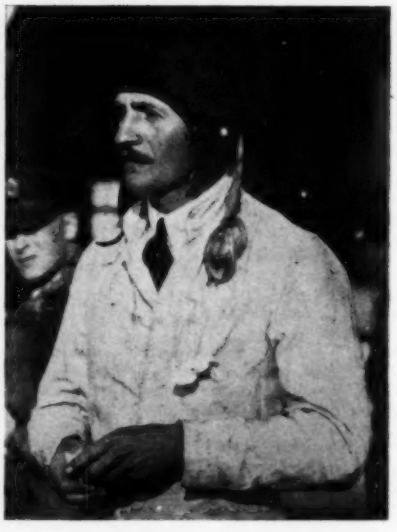
THE SCHNEIDER TROPHY—1929

By FLIGHT-LIEUT. H. R. WAGHORN, A.F.C., R.A.F.

A lecture before the Westland Aircraft Society, Yeovil Branch of the Royal Aeronautical Society, on February 14, 1930

THE first of the 1929 team to be posted for high-speed flying was Greig, who towards the end of 1928 was sent to Calshot to make another attempt on the speed record. He achieved 319 miles an hour, which was the fastest speed on record, but did not exceed the Italian speed by a sufficiently large margin to count as a new record. While at Calshot, Atcherley and Stainforth joined him to start training, but very little flying was done during the winter months. Sqd.-Ldr. Orlebar took charge of the Flight when it was formed early in February, 1928, and I came a few weeks later. We had Moon as an engine officer, who had, of course, been with the 1927 team in the same capacity.

None of the team having been seaplane pilots, we started with the Fairey III D and Flycatcher, and then worked through the Gloster IV, Gloster IV A and Gloster IV B. I don't think any of us found any jump from a land 'plane to the ordinary seaplane, as, from the handling point of view, they are really remarkably similar. However, our first flight in the Gloster IV was a decided jump. The whine of a fast-revving engine, the seemingly endless take off, with its attendant jolts and jars magnified in some extraordinary way the difficulty of knowing what speed you are travelling at, and the apparent magnification of any inaccuracy in flying all helped in giving me at any rate, a very vivid impression of my first flight in a high-speed seaplane. The Gloster IV A and IV B had been modified since the 1927 race, and the top plane, instead of coming in line with the side cylinder banks, was raised and a centre-section fitted. This was done in order to give the pilot a better view, and while doing so set up another problem, for the centre section and header tank had apparently partially blanked off the fin and rudder, making her very unstable directionally. This was rather disconcerting on one's first flight, and necessitated a lot of "sawing" on the rudder bar until one got used to it. This directional unstableness was cured, however, by having a non-symmetrical rudder and fin fitted above the centre line. Until February, 1929, there had been very little practice flying going on owing to bad weather, but after that the Glosters, and particularly our old veteran the IV, did quite a lot of flying. Early in April the Flight moved to Calshot, where we found the S 5 N 219 awaiting us, and 220 was to join us in a few days. The transition from the Glosters to the S 5's was particularly easy, and we enjoyed flying the Supermarines every bit as much as the Glosters.



FLT.-LT. H. R. WAGHORN, R.F.C., R.A.F. (FLIGHT *Photo.*)

As we put in a few hours' practice in these high-speed machines, we found that their peculiarities which had struck us rather in our first flight gradually faded away. Like all new sensations, you get used to them. To start with, any feeling of G or acceleration is greatly exaggerated—a very slight movement on the stick back and you feel as if you are being shoved through the seat, and if, after a bit of a climb you inadvertently ease the stick forward too quickly, you feel as if no straps on earth will hold you in. Anyone who has flown will know the pressure of G in a tight turn or loop. Of course, this force is felt in exactly the same way, only instead of 3½G being the maximum anyone would normally think of putting on (and this would be considerably uncomfortable), and which would need a heavy hand, in a high-speed machine such G is produced by a comparatively gentle movement of the stick. So it was found we were easily subject to big forces of G. This is one of the most noticeable things about high-speed flying. Some people have thought that forward acceleration would be terrific, and it has been seriously suggested in newspapers that the back-rest was to prevent pilots breaking their necks on opening the throttle. Never was there a more misleading statement, because the drag of the floats damps out any terrific acceleration at those speeds. At higher speeds the acceleration is comparatively slow. I have also seen it in print that a possible cause of the accident to the late Fl.-Lt. Kinkead was the sudden deceleration of shutting the throttle made him fall over the stick of the S 5, and push it forward. I am sure this was not the case, as I had the S 6 cut out through lack of petrol, and although such a violent procedure made the engine whip in the fuselage, the deceleration was hardly noticeable. No doubt due to the perfect streamline. In regard to whether one gets a sensation of speed, one can safely say that one does not, if flying at 200 ft. or above. On the other hand, I personally think that at 50 ft. to 100 ft. one does very definitely get a sensation of speed, especially if flying alongside the coast. It does not, however, equal the sense of speed that 40 m.p.h. on a pair of skis will provide, if any of you do any ski-ing. Once in the air the actual handling is identical with any ordinary aeroplane. All the machines we were flying had nicely harmonised controls, and not in any sense heavy.

One of the first problems that confronted us was to find the most efficient method of turning. The type of big

climbing turn in which the pilot gained a lot of height and then dived in to the course was ruled out fairly early on; in fact, it was proved to be inefficient by the 1927 team. At first we thought that a completely level type would be best, but some of us thought it would be best to let the machine climb very slightly; the reason for this was that owing to aileron drag, there was a strong tendency for the machine to climb at the start of a turn, and in order to counteract this it was necessary to use a lot of rudder. It was considered that the extra surface and drag involved would not be compensated by not doing a slight climb. Hence it was, we decided, not to resist too strongly the tendency of the machine to climb when turning. On the other hand, there was a difference of opinion, and at least one of us considered that the drag, owing to letting the machine yaw upwards, was greater than extra rudder used on a level turn. Now we came to the more difficult question as to whether the turn should be tight or loose. In other words, small or large, diameter. In a fairly low speed aeroplane, an efficient tight turn is done with the stick right back at, say, 3 G. At 300 m.p.h. the most efficient turn lay somewhere between 4 and 6 G. If one did a tight turn one lost more speed and travelled a shorter distance and *vice versa*. The question was to decide which was the efficient one. For this purpose we had Hardy and Wright attached to us from R.A.E., and they inserted in our training machines various complicated working instruments which they told us kept an automatic record of accelerations, speeds, and climb. By doing out turns over a carefully-measured strip on the coast they were able to find out

(1) The diameter,
(2) G at any point,
(3) Time taken and speed of machine,

From this data our X chasers evolved the perfect turn.

I showed you just now how very easy it was to put a big G, on oneself and the machine. If about 5 or 6 G are put in on a sustained turn, there is quite a possibility of the pilot seeing "black." This is explained by the medical people as being due to the blood being drawn from behind the eyes back to the heart owing to centrifugal force. The effect starts with a slight dimming, and if the force is sustained you lose your sight. It is as if a black film comes over your eyes. The effect lasts only so long as the centrifugal force is maintained. The pilot does not lose consciousness, but it seemed to me that one lost one's quickness of thought, and that, if done repeatedly, had a decided weakening effect. The way to get the greatest G is by pulling the machine out of a dive and, although it is easier to obtain higher G in this way, the pilot can withstand such a sudden application more easily than a sustained G in a turn.

Different pilots can withstand different amounts of G, varying as to their physical fitness and the way they are built. Most of us seemed to go black between 6-7 G in a sustained turn.

With regard to training, we knocked off alcohol, and as two of us were teetotal and three *not* very keen on drink, this wasn't very difficult. Three were already non-smokers and the other two cut their cigarettes down to a minimum. We took our training fairly free and easy, as the medical view was that it was difficult to lay down any hard and fast rules, as the Service had done so little high-speed flying. But if we kept fit we shouldn't go far wrong. We played tennis and did a lot of swimming, but had no special diet or special physical exercises. Before leaving our training period I would like to mention the question of maintenance. All our machines which we had for training were designed to stand up to about one hour's full throttle flying. With this end in view, cowlings, fairings and radiators were not built with quite the solidity that one associates with the Service machine; weight had to be kept to a minimum. In the same way the plugs in the high compression engine would only stand up to three practice flights. Hence it was that we were hard put to it to keep them serviceable. They were being put to a longer life than was at first intended, and as a consequence we had to contend with leaking radiators, split cowlings and a very frequent change of engine. It necessitated a lot of overtime and night work, and we were very grateful for the way our mechanics got down to it.

THE NEW MACHINES.—The first of our new machines arrived on August Bank Holiday. It was a S.6—No. N 247. You may wonder why we received it at such a short time before the race. The reason is that the machine is started and built to the specification of the engine. While the machine is being built the engine is being tested, developed, re-tested and re-developed, and so on. In the process, the engine shape, power, consumption and cowling are altered and all the time the machine must follow the engine. Attempts are being made to increase the power, as increased power means increased speed. The time comes when someone must call a halt and decide to sink or swim with the power we have.

And hence it was that owing to the importance of added power they kept on developing the engine until the last possible moment, and we only got the delivery at rather a late date.

(To be continued.)

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THE ROYAL AIR FORCE

London Gazette, April 8, 1930.

General Duties Branch

Flight Cadet R. T. P. Clarkson, having successfully passed through R.A.F. College, Cranwell, is granted a permanent commn. as Pilot Officer on probation with effect from March 11, and with seniority of December 14, 1929; Lieut.-Comdr. E. M. C. Abel-Smith, R.N., is re-attached to R.A.F. as a Flight-Lieut. with effect from March 30, and with seniority of January 1, 1928; Flying Officer E. E. Fallick is granted a permanent commn. in this rank (September 1, 1929). The follg. Pilot Officers on probation are confirmed in rank (December 12, 1929):—F. Read, D. F. Satchwell. The follg. Pilot Officers are promoted to rank of Flying Officer (March 14):—H. R. Hughes-Hallett, E. W. Downing, L. P. Rowley, R. A. R. Robinson, C. M. D. Chambers.

Group Capt. A. Fletcher, C.M.G., C.B.E., M.C., is placed on the half-pay list, scale B (April 7 to June 30, 1930, inclusive); Flight-Lieut. H. T. Herring relinquishes his short service commn. on completion of service (April 3).

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The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House on April 10. Mr. W. S. Field was in the chair, and the other members of the committee present were: Mrs. L. M. K. Pratt-Barlow, O.B.E.; Air Commodore B. C. H. Drew, C.M.G.; Lieut.-Comdr. H. E. Perrin; Sqdn.-Ldr. A. H. Wann. The committee considered in all nine cases and made grants to the amount of £54.

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The Royal Air Force Quarterly

THE second number of the *Royal Air Force Quarterly* has now appeared, and well maintains the exceptionally high standard set by the first issue. It would be impossible to mention all the interesting articles in the issue, but probably, now that South Africa is coming so prominently on to the air map, the article on flying in the Union, by Lieut.-Col. K. R. van der Spuy, M.C., will arouse considerable interest. Among the many excellent illustrations, those taken on the decks of carriers are particularly striking.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. are granted commns. in Class A.A. (ii) as Pilot Officers on probation:—W. E. Coope, E. Shipley (March 21); A. W. A. Whitehead, N. B. Massy (March 24); J. L. H. Fletcher, R. C. Tripp, J. W. Radbone (March 25); A. H. Seymour-Lucas (March 26); A. J. S. Negus (March 27); J. A. H. Sargeaunt (March 28). Pilot Officer G. B. K. James is promoted to rank of Flying Officer (April 2). The follg. Pilot Officers on probation are confirmed in rank:—J. G. G. Moore (March 18); K. R. Warton, H. C. S. Brand (March 21); T. F. Owen (March 25); J. W. Bradley, P. Johnson (March 26).

Flying Officer G. Terrell is transferred from Class A to Class C (December 8, 1929); Flying Officer R. D. Adams relinquishes his commn. on appointment to a commn. in Indian Army (March 7).

AUXILIARY AIR FORCE

General Duties Branch

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—The follg. Pilot Officer to be Flying Officer (Feb. 28):—E. S. V. Burton.

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R.A.F. Sport

GOLF

R.A.F. v. NAVY.—On Thursday, April 2, the R.A.F. played two matches against the Navy and Marines on the Camberley Heath links. The first match was for serving officers only, and this was won by the Navy by 11½ points to ½. In the second match both serving and retired officers played. The Navy won this also, by 9½ points to 2½.

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PARLIAMENT

Clubs

..., on April 2, asked the Under-Secretary of State for Air if he ...he possibility of arranging for flying instruction to be given to ...no are proposing to enter the Royal Air Force through the ... of light aeroplane clubs instead of the existing schools, seeing that ...would result in substantial economies in addition to assisting the ...ension of these clubs ?

Mr. Montague : The Air Ministry is anxious to make the fullest use of the light aeroplane clubs, and they do already serve a very useful purpose in training possible candidates for entry into the Reserve of Air Force Officers and the Auxiliary Air Force. The standard of knowledge demanded of regular officers of the Royal Air Force is, however, much higher than that which the clubs could reasonably be expected to attain. In order to train up to that standard, which includes much more than the mere ability to fly, the clubs would need to provide themselves with aircraft of varying types and other equipment on the same scale as the flying training schools of the Royal Air Force, and would require a staff of specialised instructors in tactics, armament and the other technical subjects studied in the Service.

Mr. Everard asked if the £10 grant for each licensed pilot will be given annually to the Approved Light Aeroplane Club or only once on the pilot obtaining a licence ?

Mr. Montague : A £10 grant will be paid to the club in respect of every pilot's licence issued or renewed for a member, subject to the conditions laid down in the agreement with the club being satisfied ; consequently, subject to those conditions, if a pilot renews his licence each year, the grant is annual.

Airship Mooring Masts

Mr. Montague, on April 8, in reply to Mr. Louis Smith, said the cost of an airship mooring mast (based on that of the Cardington mooring mast) would be approximately £50,000.

United States Navy and Airship Mooring Masts

Mr. Ammon, on April 9, in reply to Commander Bellairs, said the United States ship *Patoka* has been fitted with a mooring mast, and the airships " Shenandoah " and " Los Angeles " have both moored to her.

R.A.F Flying Training Schools

Mr. Montague, in reply to Mr. Mander, said the R.A.F. flying training schools are at Netheravon, Digby, Grantham, Sealand and Abu Sueir (Egypt). Persons of civilian status are not trained at those schools. The number of short-service officers who qualified according to Royal Air Force standards in 1929 were 16, 35, 29, 54 and 35, respectively. The standard to which pupils are trained at these schools is a much higher one than that required for the A licence.

Airship R101 Expenditure

Mr. Montague, in reply to Mr. Daly, said the total expenditure on R101 up to March 31, 1930, including design, construction, power plant, experimental engines, overhead charges, shed and flight trials, running repairs, modifications and maintenance, was approximately £603,500.

Speke Aerodrome Project

Mr. Thomas, on April 10, in reply to Mr. Hall-Caine, said a formal application for a grant towards the cost of the preparation of an aerodrome site at Speke was submitted to the Unemployment Grants Committee by Liverpool Town Council on February 14 last. The scheme is under consideration by the Air Ministry.

* * * *

AIR MINISTRY NOTICES TO AIRCRAFT OWNERS AND GROUND ENGINEERS

" Moth " Aircraft D.H. 60, 60X, G, and M

1. It has been found that there is inadequate clearance between the washer, part No. H. 16132, and the rear ball race in the aileron connecting rod on aircraft of the above types. It is, therefore, desirable to incorporate the modification described in para. 3 below.

2. This modification must be incorporated before the next renewal of Certificate of Airworthiness. If, however, on examination, the washer, part No. H.16132, is found to be badly cracked, the modification should be incorporated at once and, in the case of slightly bent washers, at the earliest convenient opportunity.

3. The washers, part No. H.16132, should be removed and the connecting rod disconnected at its rear end. The studs, part No. H.11263, in the aileron lever should then be refitted on the inboard side of the lever as shown on drawing No. M.1308, this being most easily accomplished by changing over the left- and right-hand aileron levers complete. *New* washers, part No. H.16132, modified (see drawing No. M.1308) or part No. H.31185, must be fitted.

4. The above-mentioned drawing and new washers may be obtained from the De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware.

5. *Cancellation.*—Notice to Ground Engineers No. 22 of 1929 is hereby cancelled.

(*No.* 7 *of* 1930.)

Blackburn " Bluebird " Mark IV Aircraft : Pins in Connecting Rod between Control Sticks for Aileron Control

1. The attention of aircraft owners and ground engineers is drawn to the above-mentioned pins, which are not to exceed 0·470-in. in length under the head.

2. The connecting rod, housed within the elevator rockshaft, is attached to the control sticks by ½-in. diameter pins and to the ailerons connecting rod by a $\frac{7}{16}$-in. diameter pin. The pins are opposite flattened rivet heads inside the rockshaft tube, providing a fine internal clearance. Aircraft owners and ground engineers should examine this component part to ensure that pins of the correct length are fitted and that adequate clearance is provided in all positions of the control stick.

3. The modification is shown on Saunders-Roe, Ltd., drawings Nos. N.A.1502/4 and 1603/5, copies of which can be obtained upon application to Messrs. Saunders-Roe, Ltd., East Cowes, I.O.W.

The appropriate part numbers for pins of the correct length are :—Part 8, Drg. No. N.A.1603/5 ; Part 4, Drg. No. N.A.1502/4 ; Part No. 383/51.

(*No.* 8 *of* 1930.)

Inspection Tabs on Control and Bracing Cables

1. In the case of all aircraft fitted with inspection tabs in the eyes of splices of control or bracing cables, the following action should be taken.

2. Movement of the inspection tabs, and consequent chafing of the thimble and/or cable, must be prevented by securing the tabs alongside the turnbuckle or cable by wire or other suitable means.

3. Examination shall be made of all tabbed cable eyes, special attention being directed to cables which normally are hidden, and any loose tabs must be secured as indicated above.

4. *Cancellation.*—Notice to Ground Engineers, No. 1 of 1927, is hereby cancelled.

(*No.* 9 *of* 1930.)

AIR MINISTRY NOTICE TO AIRMEN

Night Flying Without Navigation Lights

Royal Air Force aircraft will be flying over the areas described below during the periods mentioned. Above an altitude of 3,000 ft., the aircraft will not exhibit navigation lights, unless other aircraft are observed in their vicinity.

1. Between 1900 and 2200 hours during the period from April 1, 1930, to September 1, 1930, inclusive, over an area bounded by straight lines joining Bishop's Stortford, Chatham, Cranbrook, Godalming, Farnborough, Windsor and Bishop's Stortford.

2. Between 2100 and 2400 hours during the period from April 1, 1930, to May 31, 1930, inclusive, over an area bounded by straight lines joining Reading, Egham, Guildford, Alton and Reading.

(*Navigational Warning No.* 7 *of* 1930.)

* * * *

Change of Address

Will readers please note that the London Office of the United Steel Companies, Ltd., and Associated Firms has now been moved to 16, Great George Street, Westminster, S.W.1. The telephone numbers and telegraphic address will remain unaltered.

* * * *

PUBLICATIONS RECEIVED

The Evolution of the Flying Machine : Balloon, Airship, and Aeroplane. By Harry Harper. Hutchinson and Co., Ltd., 34–36, Paternoster Row, E.C. Price 21*s.*

Airplane Mechanics' Rigging Handbook. By Rutherford S. Hartz and E. E. Hall. The Ronald Press Co., New York. London : Simpkin, Marshall, Ltd., 4, Stationers' Hall Court, E.C. Price 15*s.* net.

Aluminium Foundry Data. The British Aluminium Co., Ltd., Adelaide House, King William Street, London, E.C.4.

Journal of the Royal Aeronautical Society. No. 231. Vol. XXXIV. March, 1930. The Royal Aeronautical Society, 7, Albemarle Street, London, W.1. Price 3s. 6d.

Bourjade : Le pilote de Sainte-Therese. By E. Peyriller. Librairie Plon, 8, Rue Garanciere, Paris. Price 15 fr.

Aircraft Instruments. By C. J. Stewart. Chapman and Hall, Ltd., 11, Henrietta Street, London, W.C.2. Price 21*s.* net.

* * * *

NEW COMPANY REGISTERED

ARROW AIRCRAFT (LEEDS), LTD. Capital £5,000 in £1 shares. Acquiring the business of manufacturers of aircraft and the component parts and accessories thereof, and mechanical and general engineers carried on by A. C. Thornton, S. Oddy, H. Dowson, W. Kenworthy, I. M. Brown and H. Broadbent, at Whitehall Road, Leeds. First directors : A. C. Thornton, Luxor View, Harehills, Leeds, designer ; S. Oddy, North Park Grove, Roundhay, Leeds, draughtsman ; H. Dowson ; I. M. Brown ; W. Kenworthy ; H. Broadbent, 2, Basinghall Square, Leeds, solicitor.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations* : Cyl. = cylinder ; i.c. = internal combustion ; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1928

Published April 17, 1930

34,543. F. H. Rogers (Eclipse Machine Co.). Starter for aeroplane or other i.c. engines. (326,862.)

37,699. F. Duncanson. Aircraft structures. (326,870.)

APPLIED FOR IN 1929

Published April 17, 1930

3,653. Sir W. G. Armstrong-Whitworth Aircraft, Ltd., and H. N. Wylie. Air-screw hubs. (326,942.)

15,419. T. Scott. Aerofoils. (327,052.)

17,246. A. E. and H. O. Short. Amphibian aircraft. (327,060.)

20,278. E. Heinkel. Starting-devices for flying machines. (327,073.)

22,668. E. Heinkel. Launching-tracks for flying machines. (316,150.)

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